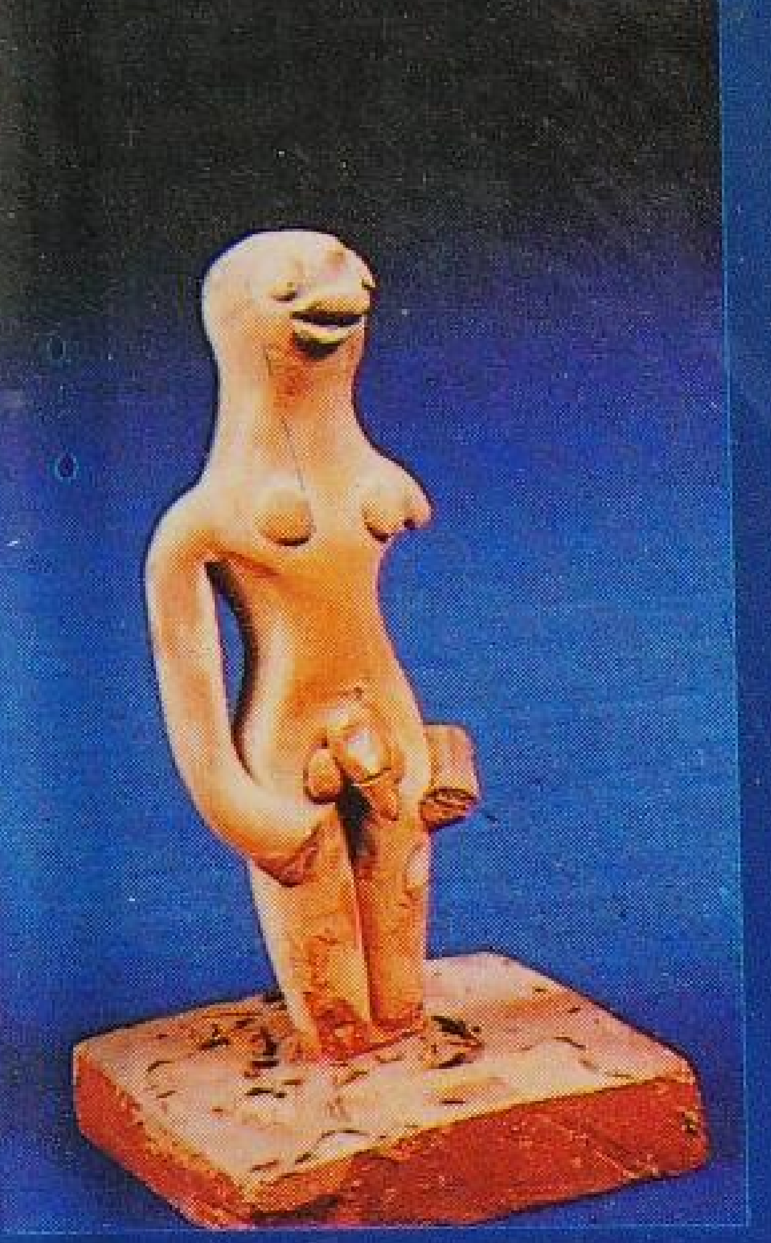
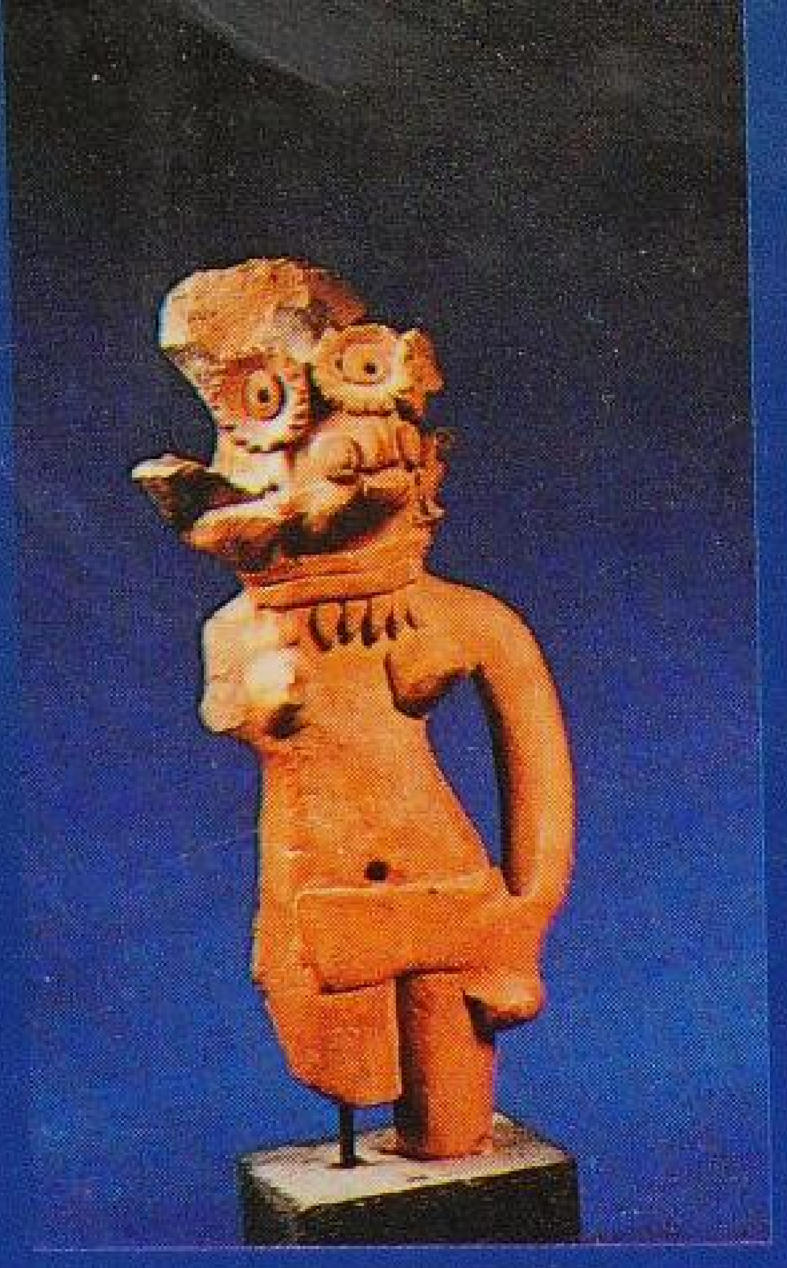
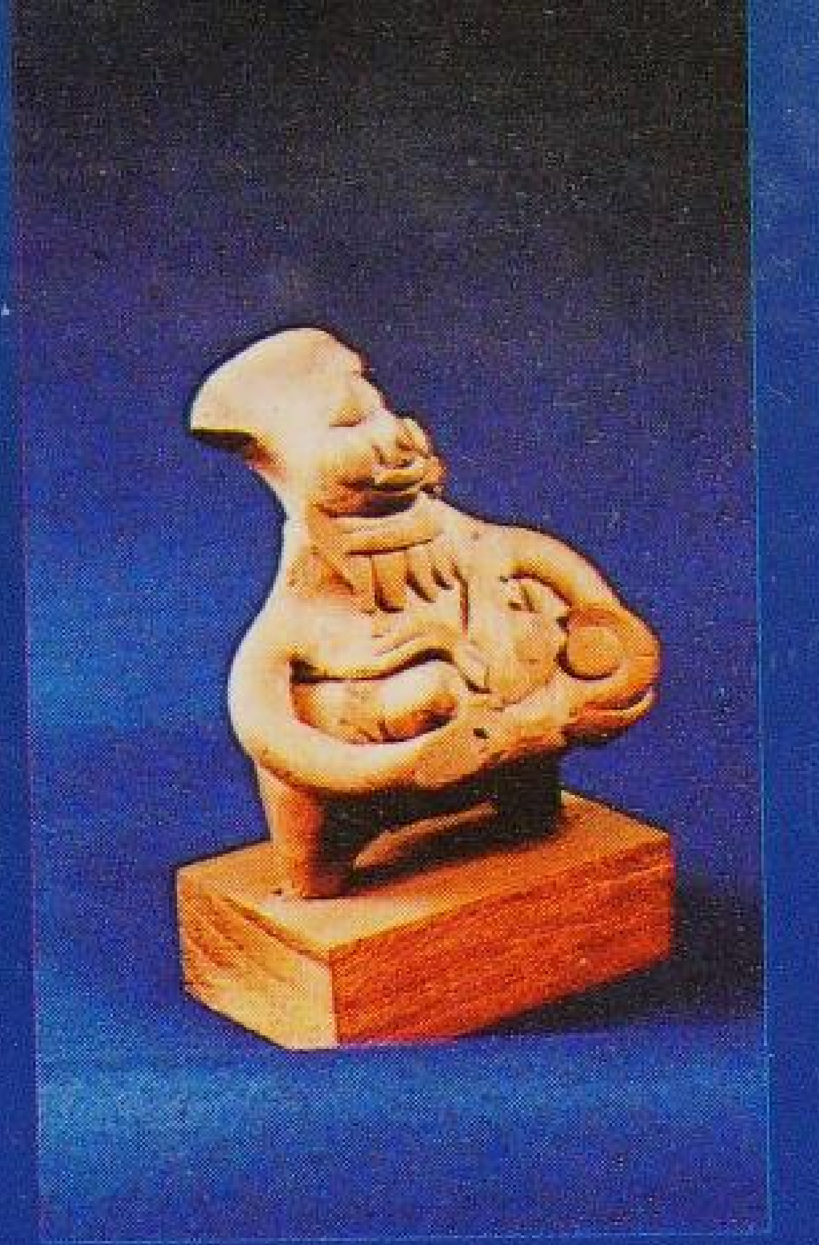
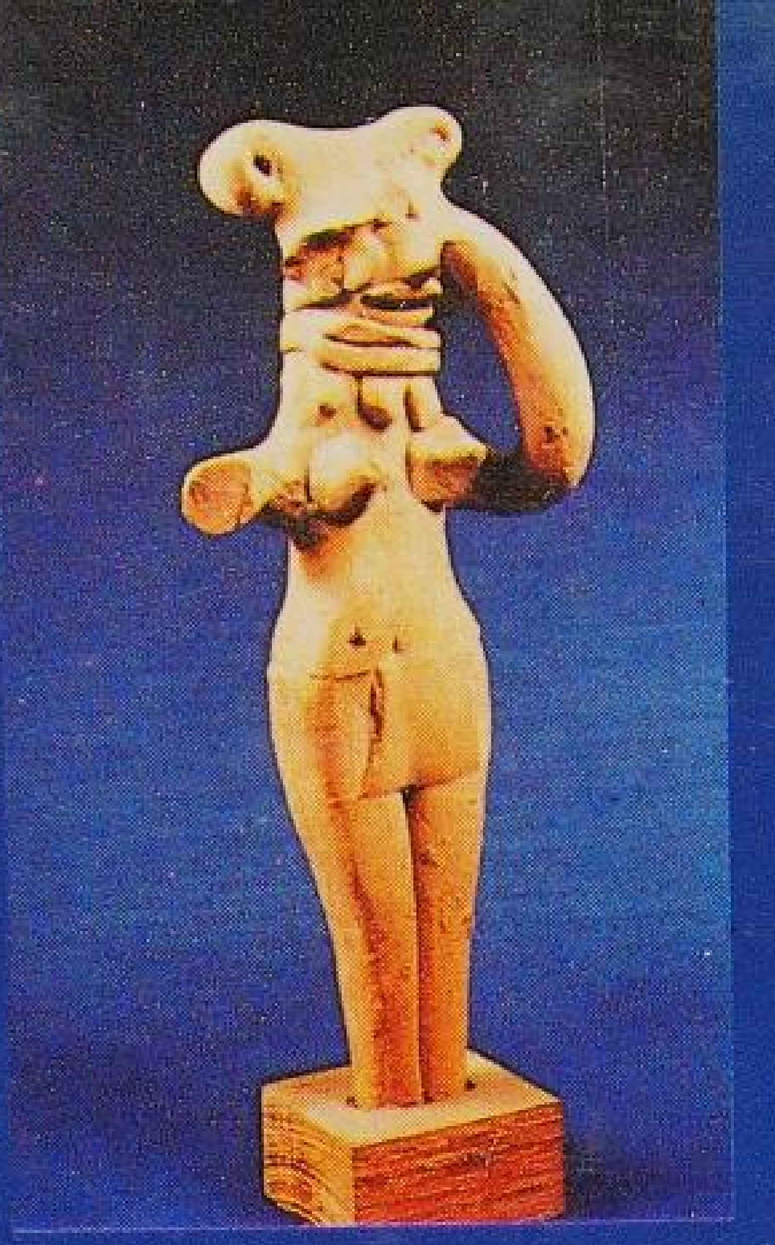
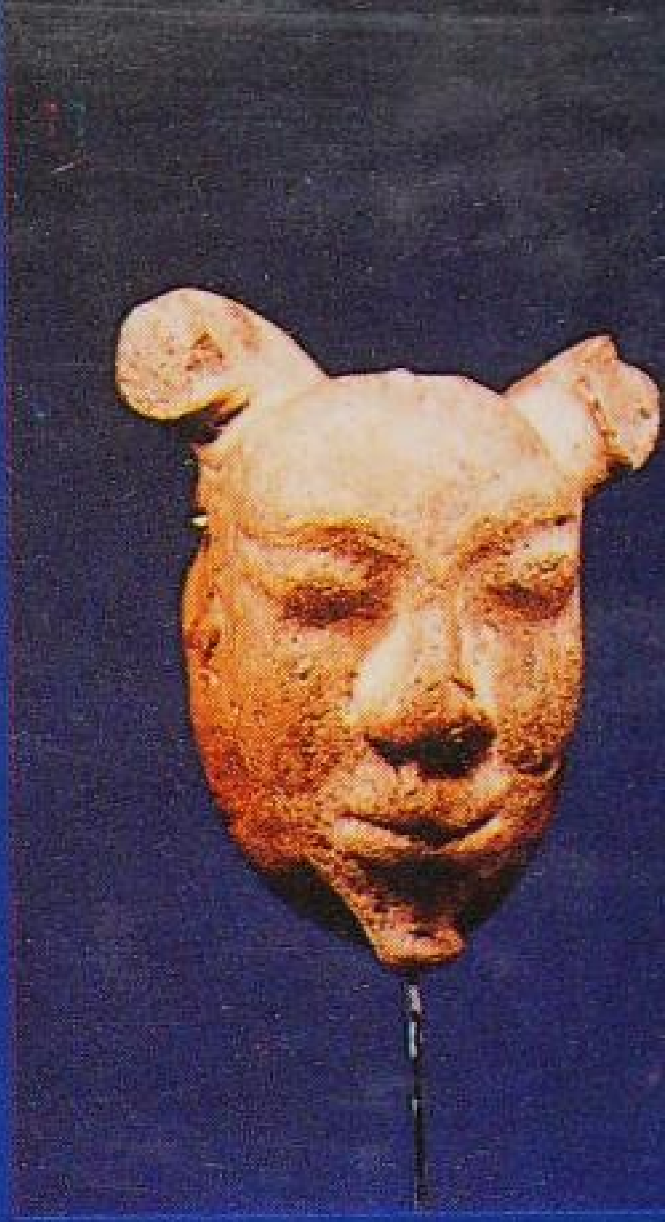
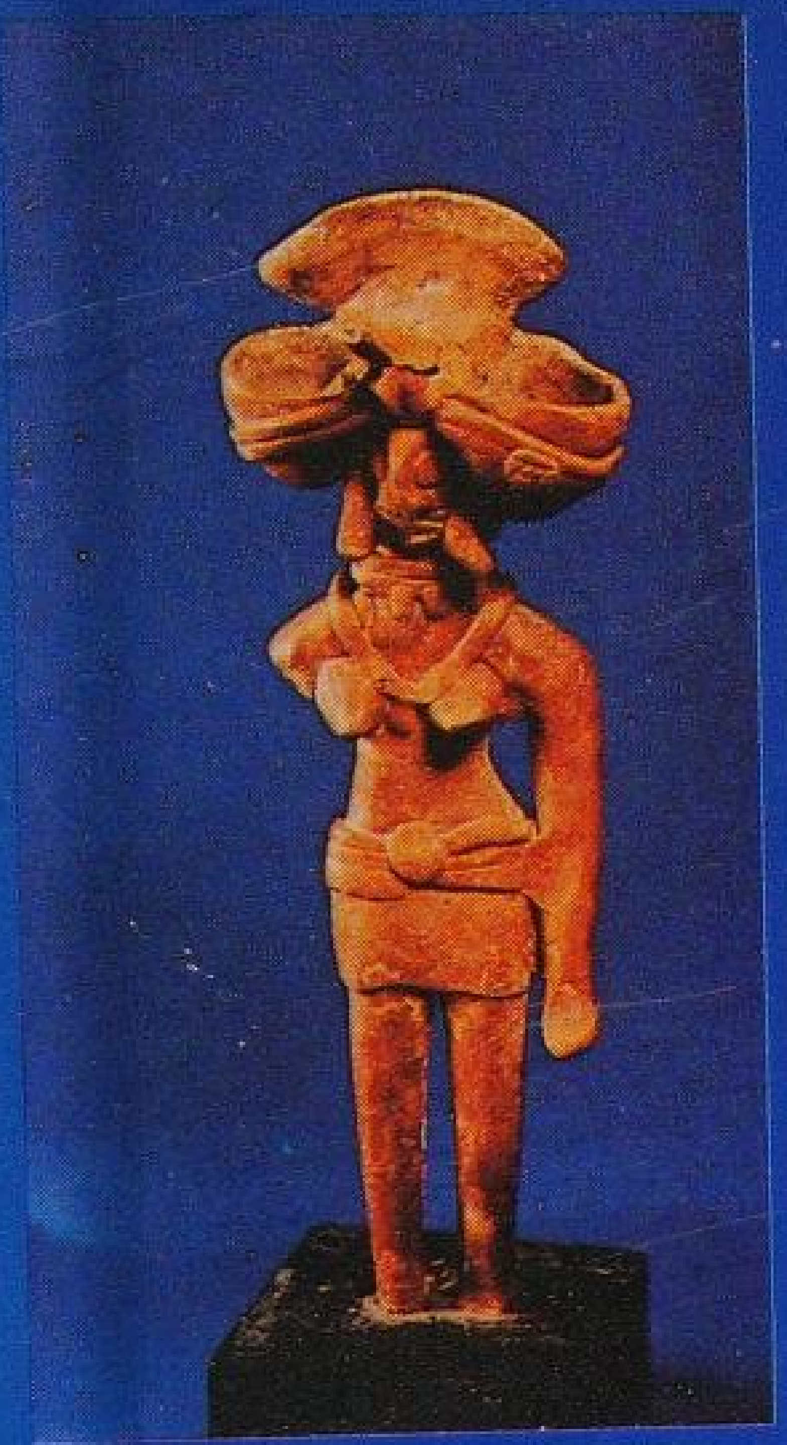
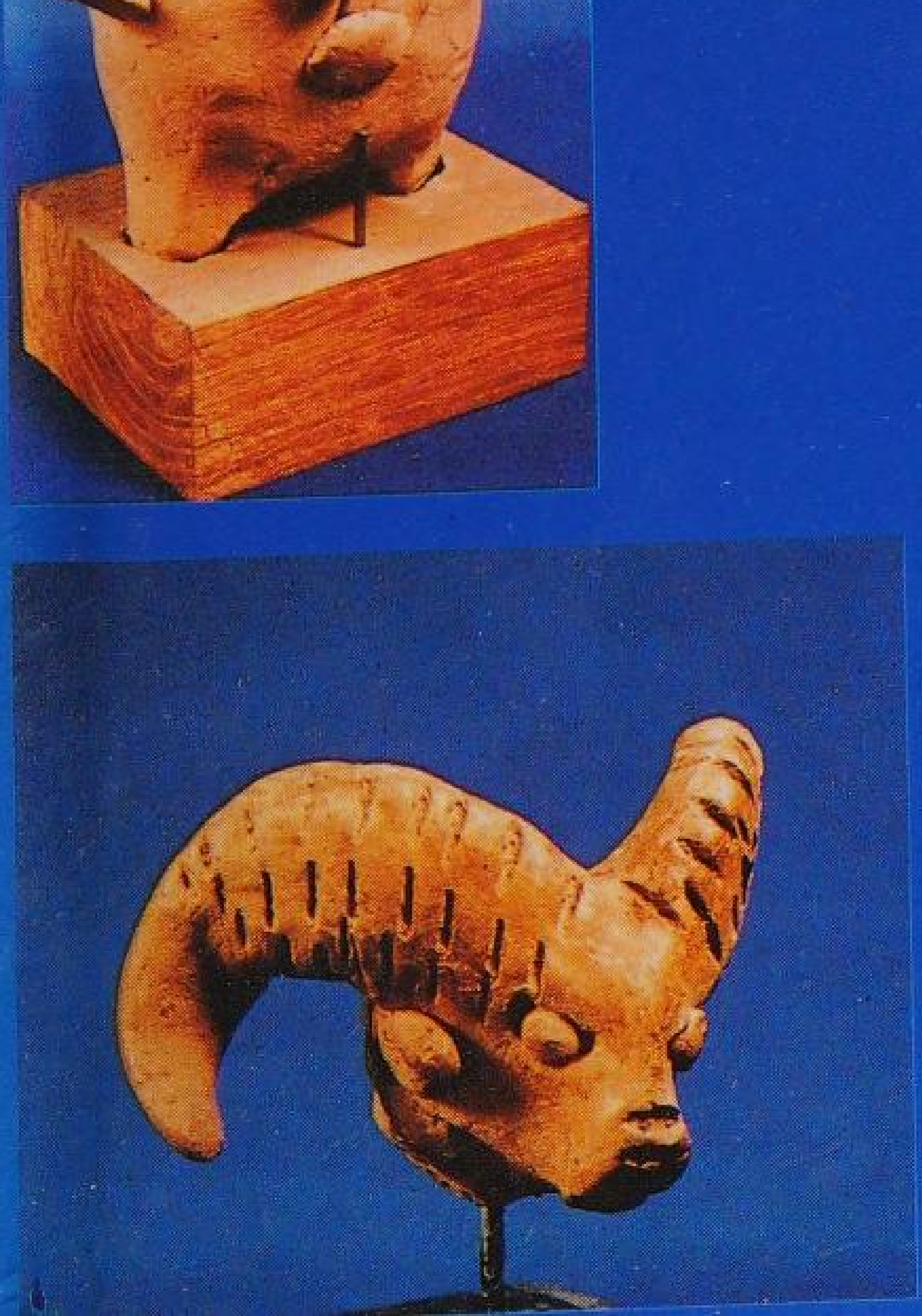
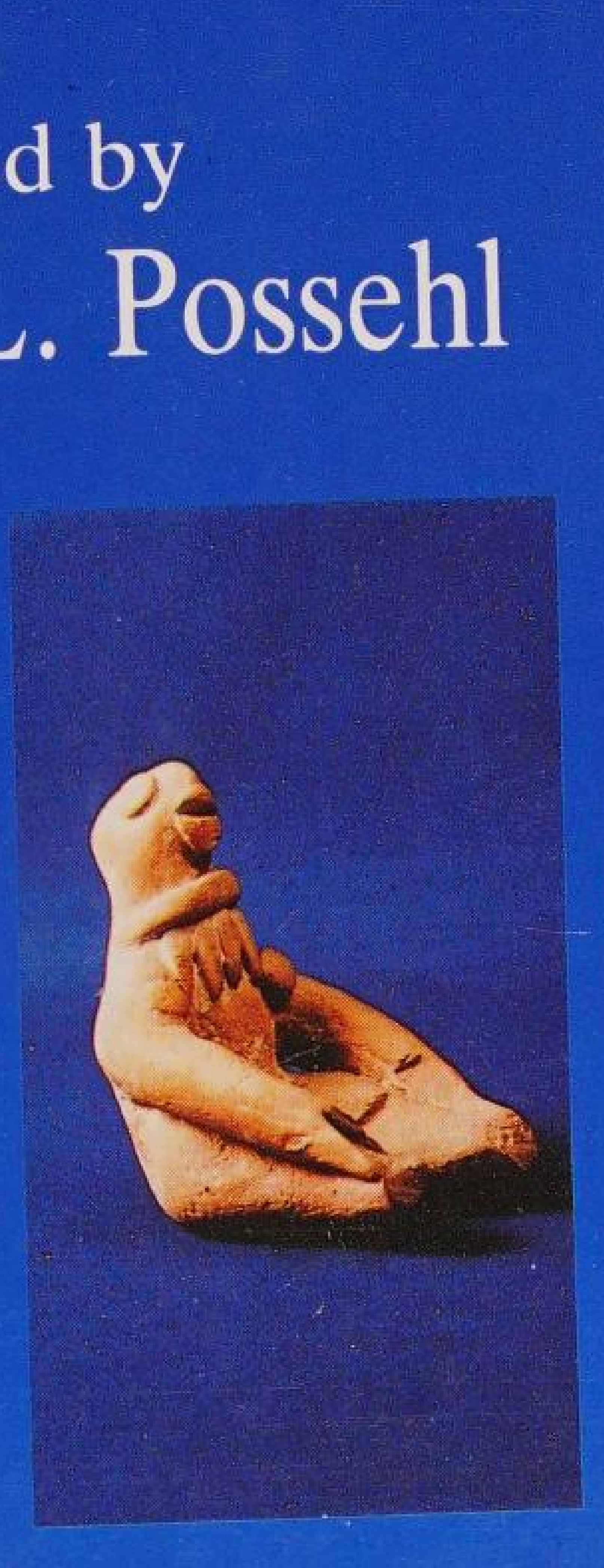
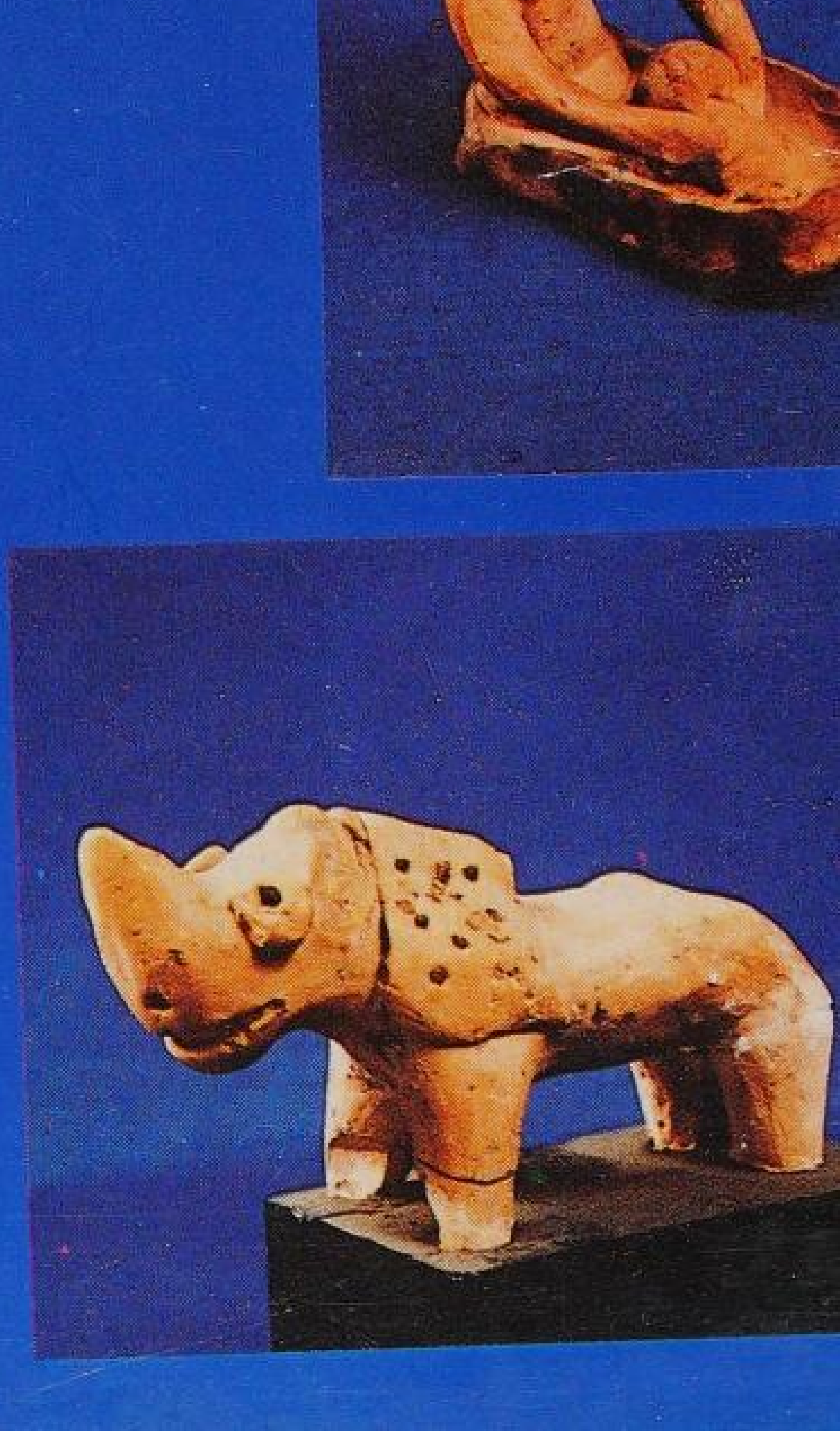







HARAPPAN CIVILIZATION

SECOND REVISED EDITION

Edited by
Gregory L. Possehl



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In 1982 the first edition of HARAPPAN CIVILIZATION was published. It was very well received as the first publication of its kind, bringing together the work of the world's greatest experts on ancient India's earliest cities.

Since then, with reinvigorated research, archaeologists have continued to expound newer theories and authenticate more discoveries, in their quest of understanding the Harappans and their world.

In this thoroughly revised and updated edition, the editor, Prof. Gregory L. Possehl has introduced two completely new sections: *Harappan Archaeology and the Gulf,* and *Results of Recent Excavatons.* Earlier, well-known and widely discussed aspects, have now been deleted in this edition, to give way to newer information. This dramatic reconstruction ensures that this book will be a tremendous successor to the widely acclaimed earlier publications.

Photographs on cover by
courtesy of National Museum,
New Delhi

HARAPPAN CIVILIZATION

A Recent Perspective

HARAPPAN CIVILIZATION

A Recent Perspective

Second Revised Edition

Edited by

GREGORY L. POSSEHL

AMERICAN INSTITUTE OF INDIAN STUDIES
and

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Preface to the Second Revised Edition.

This edition is a significant revision of the original work, *Harappan Civilization:* A *contemporary perspective,* which brought together the papers from a conference held in Srinagar in July 1979. An entirely new section of three papers has been added to this edition, covering the important discoveries of a Mature Harappan presence in the Arabian Gulf. This was not a topic that was sufficiently well developed in 1979 for it to have been one of the subjects discussed at the original conference, however recent years have seen much archaeological activity in this region with important discoveries, such as those at Tell Abraq. In fact, it is clear that some of the most important work on understanding the Harappan Civilization is now being done in the Gulf and future years will see many interesting developments in the area.

This new edition has also provided an opportunity to present the results of recent field work on the Harappan Civilization in both India and Pakistan. Thus, reports on excavations at Harappa, Ghazi Shah, Lewan and Kuntasi are included along with a number of other reviews. These are especially important in maintaining the sense that *Harappan Civilization* remains a timely source for the understanding of this fascinating urban system.

Finally, it has been necessary to delete some papers that appeared in the original edition of this work. This was an essential step given the bulk of the book. By adding approximately twenty-five percent more material, we tested the limits of a single volume. Making decisions on what would be omitted was not easily accomplished. To give some sense of reason and pattern to the process, and keep in view the "recent perspective", whole sections of papers were dealt with, rather than a hit-and-miss approach. Those authors whose papers remain only in the first edition can be assured that this decision is not a reflection of any disminished quality in their work.

The new edition of *Harappan Civilization* will keep this popular book in reach of the public interested in ancient Indian civilization. I want to thank all our contributors for making this possible, as well as the National Museum, New Delhi, for making the images used on the dust jacket available to us.

Funds from the National Science Foundation provided a handsome subvention for the publication of this edition.

GREGORY L. POSSEHL

Preface to the First Edition

The conference on which this book is based was made possible through the generosity of the government of India and the Archaeological Survey of India. It was held in Kashmir on 22–24 June, 1979. A grant from the Smithsonian Foreign Currency Program provided the funds to the American Institute of Indian Studies, Center for Art and Archaeology that enabled the conference delegates to visit Srinagar, a splendid site for any meeting. The Smithsonian also provided the funds which have made this publication possible. The persons who played key roles in making the conference possible are too numerous to mention individually, however the former Directors General of the Arhaeological Survey, Dr. M.N. Deshpande and Dr. B.K. Thapar; Ms. Francine Berkowitz of the Smithsonian Institution and Dr. F.R. Asher, former Chairman of the Art and Archaeology Committee of the American Institute of Indian Studies must be recognized.

The staff of the American Institute of Indian Studies in New Delhi was unselfish in devoting its time and energy to making the conference, and this publication, a success. Mr. P.R. Mehendiratta, Director of the Institute was our constant, patient leader and without his energy and wisdom the venture could not have been the success it was. In New Delhi and Srinagar Mr. L.S. Suri and V. Ram Nambiar saw us through the traumas of living in an unfamiliar environment. Their efforts were largely concerned with matters of travel, accommodations and the duplication of papers—essential matters, the careful execution of which is essential for the peace of mind necessary for intellectual endeavors to succeed.

The editing of the conference papers was done in Philadelphia at the University of Pennsylvania. The excellent typists at the University Museum, Carolan Yarazower and Raymond Rorke, devoted many hours of their time to this book. Raymond Crow, my associate during the Summer of 1980, was unfailing in his devotion to the quality and accuracy of the bibliographies. His sharp eyes and keen mind have made a real contribution to this aspect of the publication. Many of the illustrations were photographically duplicated in the Museum's studio by William Clough and Fred Schoch. The quality of the end product is testimony to their superb skill. Thank you all.

Finally, I must thank the delegates to the seminar for their contributions to furthering our understanding of ancient Indian civilization.

GREGORY L. POSSEHL

Contents

Preface to the Second Revised Edition v

Preface to the First Edition vii

Contributors and Participants xiii

Illustration Credits xvii

List of Abbreviations xix

Introduction

B.K. THAPAR: The Harappan Civilization: Some Reflections on Its Environments and Resources and Their Exploitation 3

GREGORY L. POSSEHL: The Harappan Civilization: A Contemporary Perspective 15

PART I: The Nature of Harappan Urbanization

1. VISHNU-MITTRE: The Harappan Civilization and the Need for a New Approach 31
2. JIM G. SHAFFER: Harappan Culture: A Reconsideration 41
3. S.P. GUPTA: The Late Harappan: A Study in Cultural Dynamics 51
4. C.C. LAMBERG-KARLOVSKY: Sumer, Elam and the Indus: Three Urban Processes Equal One Structure? 61
5. K.V. SOUNDARA RAJAN: Motivations for Early Indian Urbanization: An Examination 69

PART II: Results of Recent Fieldwork

6. JEAN-FRANÇOIS JARRIGE: Excavations at Mehrgarh: Their Significance for Understanding the Background of the Harappan Civilization 79
7. M. RAFIQUE MUGHAL: Recent Archaeological Research in the Cholistan Desert 85
8. GEORGE F. DALES: Mohenjodaro Miscellany: Some Unpublished, Forgotten, or Misinterpreted Features 97
9. WALTER A. FAIRSERVIS, JR.: Allahdino: An Excavation of a Small Harappan Site 107
10. R.S. BISHT : Excavations at Banawali: 1974–77 113
11. R.C. AGRAWALA and VIJAY KUMAR: Ganeshwar-Jodhpura Culture: New Traits in Indian Archaeology 125

12. B.P. Sinha: Harappan Fallout (?) in the Mid-Gangetic Valley 135
13. Y.D. Sharma: Harappan Complex on the Sutlej (India) 141
14. R.N. Mehta: Some Rural Harappan Settlements in Gujarat 167
15. S.A. Sali: The Harappans of Daimabad 175
16. Jagat Pati Joshi and Madhu Bala: Manda: A Harappan Site in Jammu and Kashmir 185
17. Y.M. Chitalwala: Harappan Settlements in the Kutch-Saurashtra Region: Patterns of Distribution and Routes of Communication 197

PART III: Ecology, Technology and Trade

18. Vishnu-Mittre and R. Savithri: Food Economy of the Harappans 205
19. D.P. Agrawal and R.K. Sood: Ecological Factors and the Harappan Civilization 223
20. Bridget Allchin: Substitute Stones 233
21. K.T.M. Hegde, R.V. Karanth and S.P. Sychanthavong: On the Composition and Technology of Harappan Microbeads 239
22. Marcia Fentress: From Jhelum to Yamuna: City and Settlement in the Second and Third Millennium B.C. 245
23. Shereen Ratnagar: The Location of Harappa 261
24. Dilip K. Chakrabarti: 'Long Barrel-Cylinder' Beads and the Issue of Pre-Sargonic Contact between the Harappan Civilization and Mesopotamia 265
25. Shashi Asthana: Harappan Trade in Metals and Minerals: A Regional Approach 271
26. Steven A. Weber: Changes in Plant Use at Rojdi: Implications for Early South Asian Subsistence Systems 287
27. Richard H. Meadow: Animal Domestication in the Middle East: A Revised View from the Eastern Margin 295

PART IV: Harappan Archaeology and the Gulf

28. Daniel T. Potts: Tell Abraq and the Harappan Tradition in Southeastern Arabia 323
29. Christopher Edens: Indus-Arabian Interaction during the Bronze Age: A Review of Evidence 335
30. Maurizio Tosi: The Harappan Civilization beyond the Indian Subcontinent 365

PART V: The Later Phases of the Harappan Tradition

31. A. Ghosh: Deurbanization of the Harappan Civilization 381
32. F.R. Allchin: The Legacy of the Indus Civilization 385

33. B.B. LAL: West was West and East was East, but When and How Did the Twain Meet? The Role of Bhagwanpura as a Bridge between Certain Stages of the Indus and Ganges Civilizations 395

34. K.N. DIKSHIT: Hulas and the Late Harappan Complex in Western Uttar Pradesh 399

35. S.R. RAO: New Light on the Post-Urban (Late Harappan) Phase of the Indus Civilization in India 413

36. M.K. DHAVALIKAR: Daimabad Bronzes 421

37. ROBERT SHARER: Did the Maya Collapse? A New World Perspective on the Demise of the Harappan Civilization 427

38. D.P. AGRAWAL: The Harappan Legacy: Break and Continuity 445

PART VI: New Excavation Reports

39. LOUIS FLAM: Excavations at Ghazi Shah, Sindh, Pakistan 457

40. GEORGE F. DALES and J. MARK KENOYER: The Harappan Project 1986-1989: New Investigation at an Ancient Indus City 469

41. BRIDGET ALLCHIN and RAYMOND ALLCHIN: Lewan—A Stone Tool Factory of the Fourth to Third Millennium B.C. 521

42. M.K. DHAVALIKAR: Harappans in Saurastra: The Mercantile Enterprise as Seen from Recent Excavation of Kuntasi 555

PART VII: Conclusion

43. ROBERT H. DYSON, JR.: Paradigm Changes in the Study of the Indus Civilization 571

Index . 583

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Dust jacket illustration thanks to the National Museum, New Delhi.

List of Abbreviations

DSW	Degenerate Siswal Wares
MASCA	Museum and Applied Science Center for Archaeology
NBPW	Northern Black Polished Ware
OCP	Ochre Colored Pottery
PGW	Painted Gray Ware
NBPW	Northern Black Polished Ware

INTRODUCTION

B.K. THAPAR

The Harappan Civilization: Some Reflections on Its Environments and Resources and Their Exploitation

HARAPPAN Culture is a field of study which has fascinated scholars and laymen alike for the past six decades. During this period, which has been marked by an advancement in science and technology, many revolutionary discoveries have been made, admittedly with some indispensable though volatile contributions. But, all have required a search for new interpretations of old evidence. It is fully well known that neither history nor any other human activity can be definitive as long as the human race continues to exist. Thus, new dimensions are being added to knowledge of the Harappan Civilization through fieldwork, conducted both in India and Pakistan and, if I may add, Afghanistan, Iran and the Turkmenian Republic of the U.S.S.R. This has resulted in a serious challenge to the old platitude concerning the homogeneity of this civilization. In fact, it might be said that one is now in a position to see the woods, thanks to the thinning of the trees.

The occurrence of a few sherds of Pre-Harappan type in the Neolithic levels at Burzahom only indicates an as yet isolated contact with the mid-Indus basin and not a cultural spread. Such a phenomenon provides the archaeologist a worthwhile basis for reflection, a reflection on *why* and *where*, and I have chosen for my paper, a germane theme, viz., the environment and resources of the Harappan Civilization.

GEOGRAPHICAL FEATURES

It is widely known that the earliest civilizations of the ancient world, such as the Mesopotamian and the Egyptian, were riverine in their environmental setting. However, the geographical factors relevant to the settlements in the Indus Valley are similar to those between the Mesopotamian lowlands and the Iranian highlands. The greater Indus Valley (Fig. 1) can be divided into two principal divisions: (1) the Baluchistan plateau with the western highlands, represented by Sind Kohistan, Kirthar, and Sulaiman ranges, and (2) the lower Indus Valley, represented by the western and eastern valley sections as well as the delta area. The Thar Desert on the eastern margin of the valley formed an effective barrier, isolating it from the rest of India. The western hill country on the other hand was not a barrier because of the numerous transverse lines of drainage through these mountain ranges which promoted communication from the valley to the Iranian Plateau. The most important of these are the Mula, Muskhat and Bolan Passes.

The Baluchistan Plateau and the Indo-Iranian borderlands, lie beyond this watershed. They had a different ecology, and this was the area that witnessed the early village-town settlements which formed the background for the evolution of cities along the Indus. The barely habitable dry plateau of Iran and Baluchistan drove the highlanders into the fertile valley of the Indus. This movement was possible because of the lower slopes of the Kirthar and Sulaiman ranges falling gently into the plains below.

The rugged and desolate character of the western highlands is accentuated by the extreme sparseness of its vegetation. In spite of the altitude (over 2000

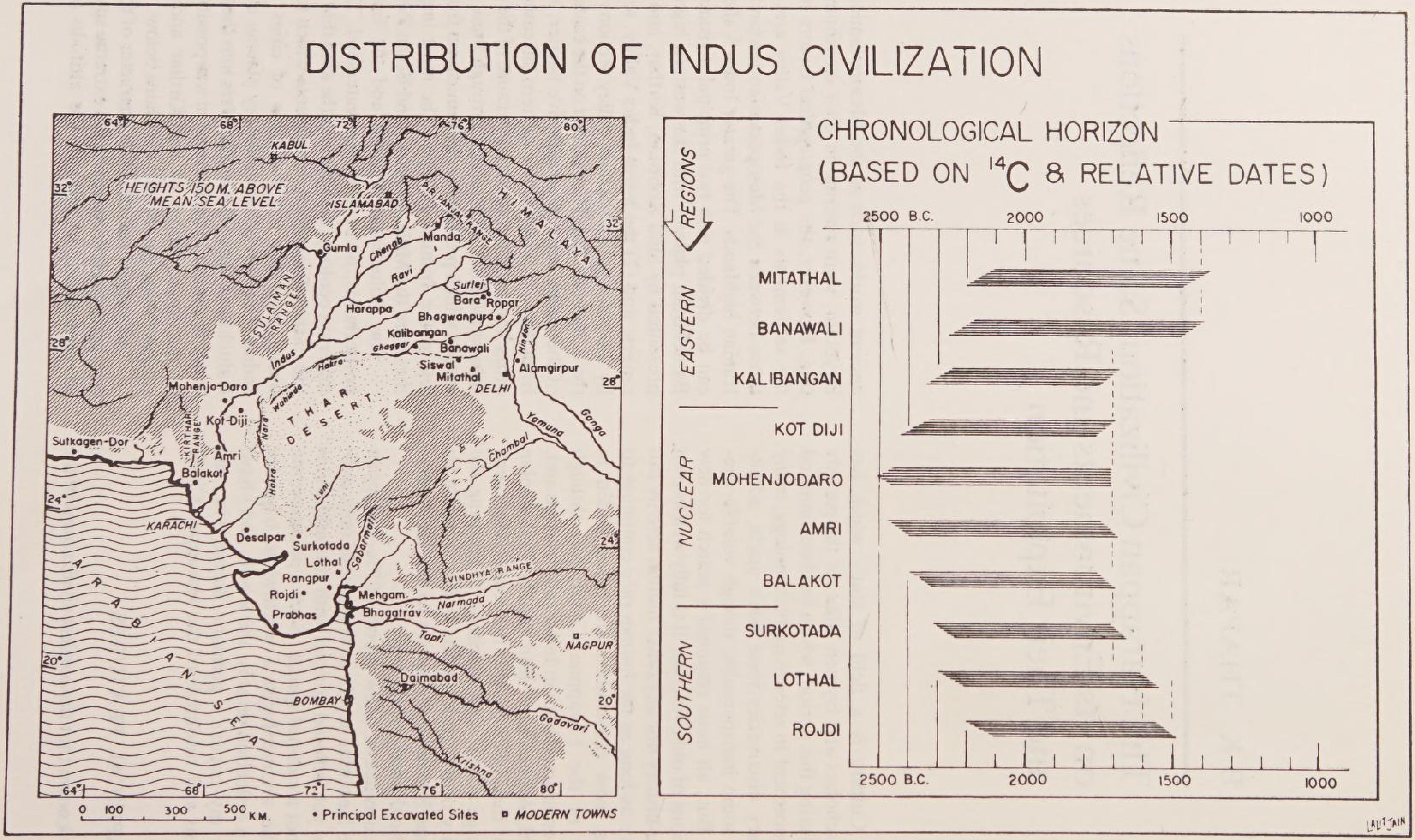

DISTRIBUTION OF INDUS CIVILIZATION
HEIGHTS 150 M. ABOVE MEAN SEA LEVEL
KABUL
ISLAMABAD
HIMALAYA
PIR PANJAL RANGE
SULAIMAN RANGE
KIRTHAR RANGE
Gumla
Chenab
Manda
Ravi
Sutlej
Bara
Ropar
Harappa
Bhagwanpura
Kalibangan
Ghaggar
Banawali
Hakra
Siswal
Mitathal
DELHI
Hindon
Alamgirpur
Indus
Mohenjo-Daro
Kot-Diji
Wahinda
Nara
THAR DESERT
Yamuna
Ganga
Chambal
Sutkagen-Dor
Amri
Balakot
Luni
KARACHI
Desalpar
Surkotada
Sabarmati
Lothal
Rangpur
Rojdi
Prabhas
Mehgam
Bhagatrav
VINDHYA RANGE
Narmada
Tapti
NAGPUR
Daimabad
BOMBAY
Godavari
Krishna
ARABIAN SEA
64° 68° 72° 76° 80°
32° 28° 24° 20°
0 100 300 500 KM.
• Principal Excavated Sites
▫ MODERN TOWNS
CHRONOLOGICAL HORIZON
(BASED ON ¹⁴C & RELATIVE DATES)
REGIONS
EASTERN
NUCLEAR
SOUTHERN
MITATHAL
BANAWALI
KALIBANGAN
KOT DIJI
MOHENJODARO
AMRI
BALAKOT
SURKOTADA
LOTHAL
ROJDI
2500 B.C.
2000
1500
1000
LALIT JAIN

Fig. 1. Distribution of the Indus Civilization.

meters) rainfall is scanty. Nevertheless, it afforded excellent grazing to sheep and goats and to the wild ibex. A noteworthy feature of these hill ranges was the development of gravel slopes at the base of the hills, forming a piedmont zone between the western highlands and the alluvium in the east. The plain immediately adjoining these slopes in the northern sector across the lower reaches of the Bolan River and Nari and Chakar *nais* is known as Kachi. It is formed of alluvium deposited from the hills, quite distinct from that derived from the Indus from which it is separated by a flat desert of clay-like soil known as *pat*. An equally distinct tract, known as the plain of Las, extends about 90 kilometers northwards from the seacoast. It drains an area of considerable magnitude in Kohistan and is composed of alluvium deposited by the Porali, Hab, and Malir Rivers. Yet another potential agricultural area lay about Lake Manchar. This largest freshwater lake in India was the repository of water spilling from the flood-channels of the Indus, including the western Nara as well as the drainage of the hill country.

During periods of inundation, it covers an area of over 500 square kilometers but shrinks to a mere 36 square kilometers as a result of post-monsoonal drying. This periodically changing level of filling and emptying thus affords an excellent arable land for cultivation, especially for the *rabi* crop.

The Indus system, which primarily consists of two rivers, the Indus and the Hakra-Wahinda (modern eastern Nara) along with their tributaries, flows through Sind, Rajasthan, Punjab and Haryana. Both these rivers, especially the latter, have left marks of their old courses or channels (Figs. 2 and 3). These rivers have also been called the Mihran of Sind. The Indus Plain in Sind is a relatively narrow east-west strip about 200 kilometers wide contained by the Thar Desert on the east and the Kirthar Range on the west. The Kachi Plain and Lake Manchar are two distinct ecological regions which have had great influence on the settlement and subsistence pattern of the region.

In the Hakra system (represented by the Naiwal, Hakra, Wahinda and Sottar) which is now largely dried up, excepting the upper part (then represented by the Ghaggar, Sarasvati, Drishadvati) the middle and lower part (now converted into the Eastern Nara Canal), most conspicuous changes have taken place. Various theories have been advanced for this. Some scholars postulate that at one time the River Yamuna flowed westwards through a channel such as the Western Yamuna Canal or the Chautang (ancient Drishadvati) and fed the Hakra, while according to others the Sutlej followed on an independent course into the Hakra. In the alluvial tract of Bahawalpur the existence of several depressions and paleochannels, indicating dried-up river beds, seems to bear testimony to the link between the two rivers perhaps a flow of the flood waters from the Beas-Sutlej link when the latter flowed further south.

The Hakra branch of the great canal system, taking off from the Sutlej at the Sulemanki Weir, perhaps represented the ancient channel of the Sutlej, meeting the Ghaggar a little above Fort Abbas. The Sutlej, a snow-fed river, carried abundant water to the Hakra system through its channel. The added volume of its waters could reasonably be held to account for the much increased width of the Ghaggar-Hakra bed west of Fort Abbas and for the occurrence of ancient sites in a continuous line throughout the Bahawalpur region. The Ghaggar was fed entirely by the monsoons in the Siwaliks, and after its link with the Sutlej ceased, its diminished waters failed to sustain the settlements downstream. The Hakra was a degrading river with a well-cut bed in the alluvium and without a large delta which a river of this size would be expected to form. Although the chronology of stream movement still remains elusive, the observed shifts in the courses seemed to have resulted from "northering" and "westering" with the possibility of the capture of the Yamuna by the Gangetic system.

The Indus, on the contrary, is identified as an aggrading river. Traveling a long distance in the Himalayas, including the chains of Ladakh, it crosses the mountains of Kohistan and Hazara and finally debouches onto the Punjab plains below Darband. Thereafter it is met by tributaries, bringing the drainage of the Hindu Kush (Kabul River), the Sulaiman Range (Kurram, Tochi, Zhob, Gomal Rivers, etc.) and further downstream, at the *panchnad*, a little north of Mithankot, the accumulated waters of the Punjab rivers. The river does not flow directly north-south but makes a deep S-shaped curve, thus adding to its cultivable land. The contours in the northern tracts run almost north-west/south-east, those in the middle, nearly east-west and those in the south approximately north-east/south-west. Being fed both by snow and monsoons periodic flooding has been an important phenomenon of its regimen. The noteworthy features of the lower reaches of the river in the Sind region are: (1) its rushing flow through the

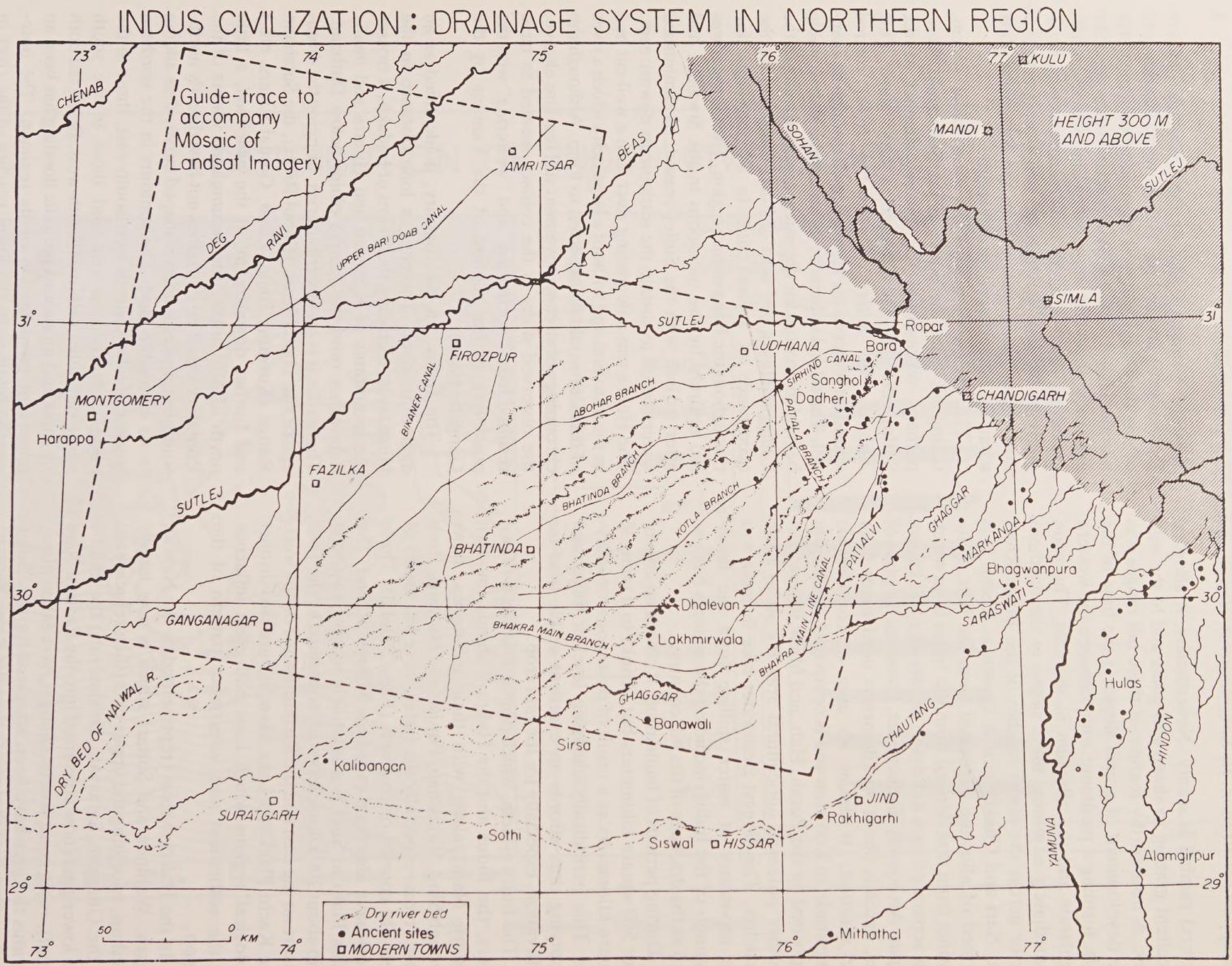

INDUS CIVILIZATION : DRAINAGE SYSTEM IN NORTHERN REGION
Guide-trace to accompany Mosaic of Landsat Imagery
HEIGHT 300 M AND ABOVE
73°
74°
75°
76°
77°
31°
30°
29°
CHENAB
DEG
RAVI
UPPER BARI DOAB CANAL
AMRITSAR
BEAS
SOHAN
MANDI
KULU
SUTLEJ
SIMLA
Ropar
Bara
LUDHIANA
SIRHIND CANAL
Sanghol
Dadheri
CHANDIGARH
FIROZPUR
BIKANER CANAL
ABOHAR BRANCH
PATIALA BRANCH
MONTGOMERY
Harappa
FAZILKA
BHATINDA BRANCH
KOTLA BRANCH
GHAGGAR
MARKANDA
Bhagwanpura
SARASWATI
PATIALVI
BHATINDA
Dhalevan
Lakhmirwala
BHAKRA MAIN BRANCH
BHAKRA MAIN LINE CANAL
GANGANAGAR
DRY BED OF NAIWAL R.
Banawali
Sirsa
CHAUTANG
Kalibangan
SURATGARH
Sothi
Siswal
HISSAR
JIND
Rakhigarhi
Mithathal
Hulas
HINDON
YAMUNA
Alamgirpur
Dry river bed
● Ancient sites
□ MODERN TOWNS
50
0
KM

Fig. 2. Indus Civilization: Drainage system in northern region.

Bukkur gap between Sukkur and Rohri in the limestone rocks; (2) the overflow lake of Manchar and the various old channels through which it rushed during the flood season; (3) the curve around the rocky Kohistan defile near Kotri; and (4) the deltaic plain from Thatta south. With the rapid rate of aggradation, the Indus delta is thought to have extended nearly 80 kilometers during the last two millennia. The gradient of the river in the Sind region, 4.8 centimeters per kilometer, which, viewed against the fact that its bed is generally higher than the surrounding plain, and the fall of the country is nearly 13 centimeters per kilometer, makes it prone to periodic flooding. The flood plain sometimes extends to a width of 16 kilometers. This seems to result from two characteristics: (1) the insufficiency of its channel to carry large flood-discharge (ranging from 20 to 40 times than that of the fair weather); and (2) the vast quantity of silt suspended in the water. Excepting between Rohri and Sukkur, where it is confined to a narrow gorge between limestone hills, it has frequently shifted its course as is evident by the existence of abandoned courses, cut-off meanders and braiding channels. In its lower reaches it seems to have shifted nearly 160 kilometers to the west, and it no longer empties into the Rann of Kutch as it is reported to have done during the time of Alexander.

As against this, the rivers of the Punjab have broad alluvial plains with beds below the general level of the flood-plain, and are characterized by high ground between them which is unaffected by the floods. Furthermore, the Punjab is a multiriver system in sharp contrast to the one-river system of Sind. On the basis of landform studies, great changes have been observed in the courses of the Ravi, Beas and Sutlej. In the past the Ravi used to flow further south with its confluence with the Chenab and Jhelum a little below Multan. At one time the Beas also appears to have followed an independent course to the Indus without joining the Sutlej. The existence of this ancient channel is clearly visible in the mosaic of lands on imagery of the area. Due to the "westering" of this river it now joins the Sutlej at Harike.

In India, no Mature Harappan sites have so far been located in the present day valleys of either of these rivers, with the singular exception of Ropar, situated along the left bank of the Sutlej in the foothills of the Siwaliks. It is reasonable to argue, therefore, that the channels of both these rivers have long been erratic and that enduring permanent settlements were not attracted to these valleys during Harappan times. As regards Ropar, communication seems to have been through the Hakra-Ghaggar system, as indicated by the occurrence of a chain of Pre-Harappan and Harappan sites, located in the valleys of the various *chols* and *nais* like Sirhind Nadi, Markanda and Patialvi, all contributing to the Ghaggar system. Some of the Ambala streams even now flow from the Siwaliks close to the Sutlej gorge.

Another distinguishable difference between Sind (including Makran) and the Punjab is the rainfall: the former region receives markedly less annual rainfall (250 millimeters or less, reflective of warm, semiarid and arid conditions) than the latter (500 millimeters or more). However, the Indus in Sind, being snow-fed has two periods of inundation: one in March–April when the snows in the Himalayas melt and the other in August when the lower ranges of the mountains receive the southwestern monsoon. Both the snowfall and the rainfall are, however, variable. Nevertheless, they can provide for the raising of double crops, *kharif* (summer) and *rabi* (winter). Of the Punjab rivers, apart from the Sutlej, the remaining rivers are only partly snow-fed and largely fed by the monsoons; the Ambala streams like Ghaggar and Sarasvati were fed by monsoons in the Siwaliks and lower Himalayas.

In the southern region of the spread of the Indus Civilization (Fig. 4) the prominent rivers involved are the Luni, Banas, Sabarmati, Mahi, Narmada, Tapti and Godavari. These all have different geophysical features which result in small dissected plateaus and scarplands in Kutch and Kathiawad and flat alluvial plains and coastal lowlands and marshes in Gujarat.

The coast of Gujarat, with the exception of South Kathiawad, is generally characterized by tidal flats and saline wastes. The coast of the Gulf of Cambay is very irregular in its outline, projecting deeply inland, thus providing suitable sites for estuarine posts. Lothal is a typical example in this case. The coast from the head of Cambay to Bulsar is irregular in outline, broken by the estuaries of the Mahi, the Narmada, the Kim and the Tapti. The entire coast is marked by tidal flats and saline marshes, locally known as *kharlands*. The Gujarat plains, located between the marshy coastal zone and the plateau and the mountains of the region, are remarkably flat where most of the rivers descending from the highlands change into sluggish meandering streams. An interesting feature of the plateaus of Kathiawad is the occurrence of numerous dykes, sometimes as wide as 60 meters, which afforded raw material for many

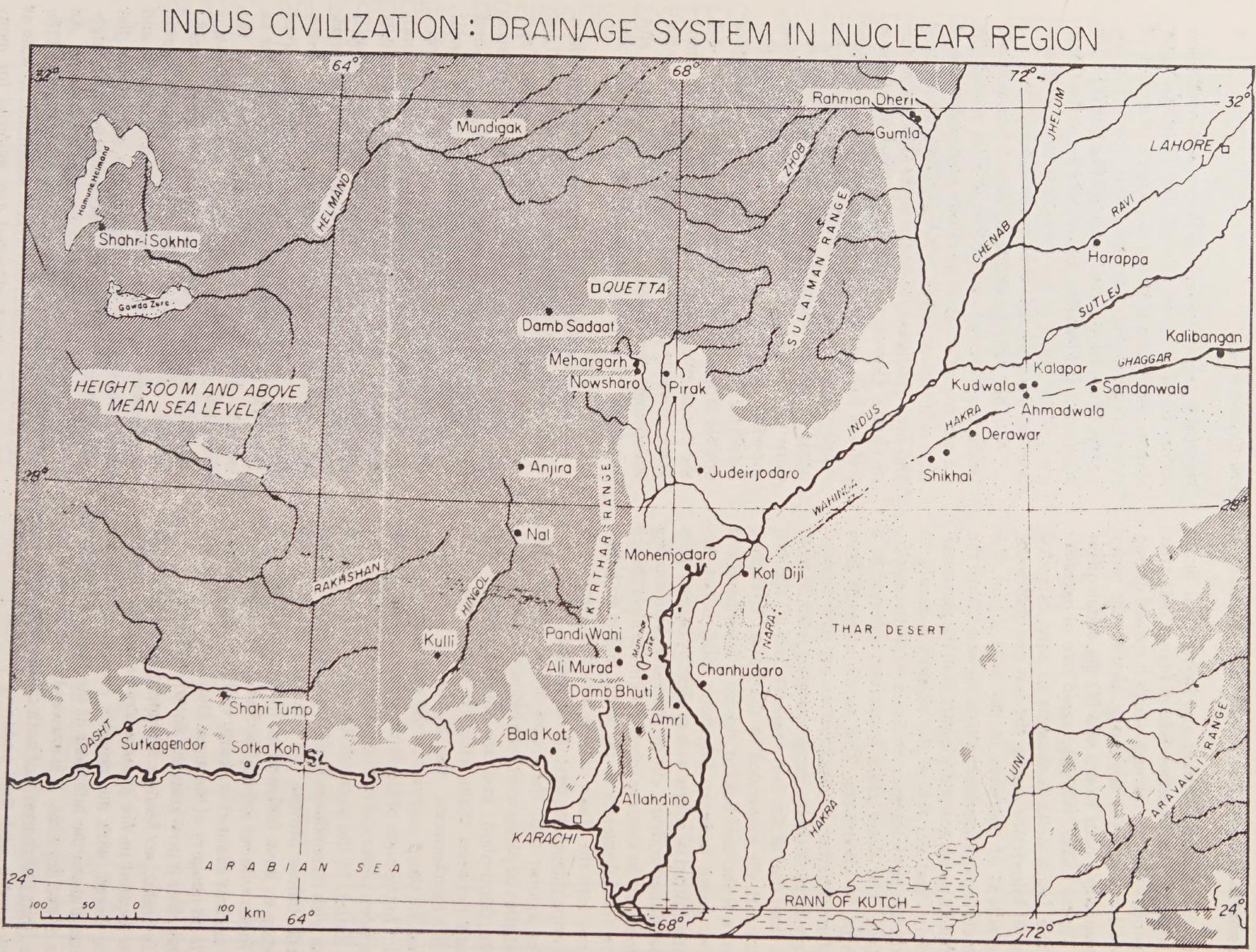

INDUS CIVILIZATION : DRAINAGE SYSTEM IN NUCLEAR REGION
32°
64°
68°
72°
28°
24°
Mundigak
Rahman Dheri
Gumla
JHELUM
LAHORE
Hamune Helmand
Shahr-i Sokhta
HELMAND
ZHOB
SULAIMAN RANGE
RAVI
CHENAB
Harappa
QUETTA
Gowda Zere
Damb Sadaat
SUTLEJ
Kalibangan
GHAGGAR
Mehargarh
Nowsharo
Pirak
Kalapar
Kudwala
Sandanwala
Ahmadwala
HAKRA
Derawar
INDUS
HEIGHT 300 M AND ABOVE MEAN SEA LEVEL
Anjira
Judeirjodaro
Shikhai
WAHINDA
KIRTHAR RANGE
Nal
Mohenjodaro
Kot Diji
RAKHSHAN
HINGOL
NARA
THAR DESERT
Kulli
Pandi Wahi
Ali Murad
Damb Bhuti
Chanhudaro
Shahi Tump
Amri
DASHT
Sutkagendor
Sotka Koh
Bala Kot
LUNI
ARAVALLI RANGE
Allahdino
KARACHI
HAKRA
ARABIAN SEA
RANN OF KUTCH
100 50 0 100 km

Fig. 3. Indus Civilization: Drainage system in nuclear region.

objects, including beads. The climate of the Kutch and Kathiawad regions varies from extreme aridity in the north to monsoonal conditions in the Cambay region.

The drainage networks of Kutch, Saurashtra (Kathiawad) and the rest of Gujarat are unrelated to one another. This partly explains the regional ramifications of the Indus Civilization in this region. In Kutch, the rivers (having a course hardly longer than 80 kilometers), flow both to the north and to the south from the central highland. They remain dry during the summer but present formidable barriers during floods. Drainage in Saurashtra has a radial pattern: rivers flow out from the central highlands in all directions. With no structural variation, the major rivers have developed a dendritic network. The drainage in the coastal areas is often impeded due to an inadequate gradient. The longest river is the Bahadar which flows westward and empties into the Arabian Sea 30 kilometers south of Porbandar. Rojadi, a Harappan site, is located in its valley. Of the rest of Gujarat, a few rivers like the Banas, Sarasvati and Rupen fall into the Little Rann, while the Sabarmati and Mahi, having their sources in the outliers of the Aravallis, and the Narmada and the Tapti, having catchment areas in different states, flow into the Gulf of Cambay. Both the Sabarmati and Mahi receive tributaries on their left banks, the Sabarmati-Mahi *doab* being essentially drained by the Sabarmati. The drainage pattern is reflective of low rainfall, permeable sandy and gravelly soils and an imperceptible gradient near the mouth. The most important rivers of Gujarat are, however, the Narmada and the Tapti. Of these, the Tapti drains the area of highest rainfall and has a higher economic potential. The lower Tapti Valley is very fertile and is covered with black cotton soil. This perhaps explains the flourishing of the Savalda and the so-called Late Harappan and other cognate Chalcolithic Cultures in this part of the valley.

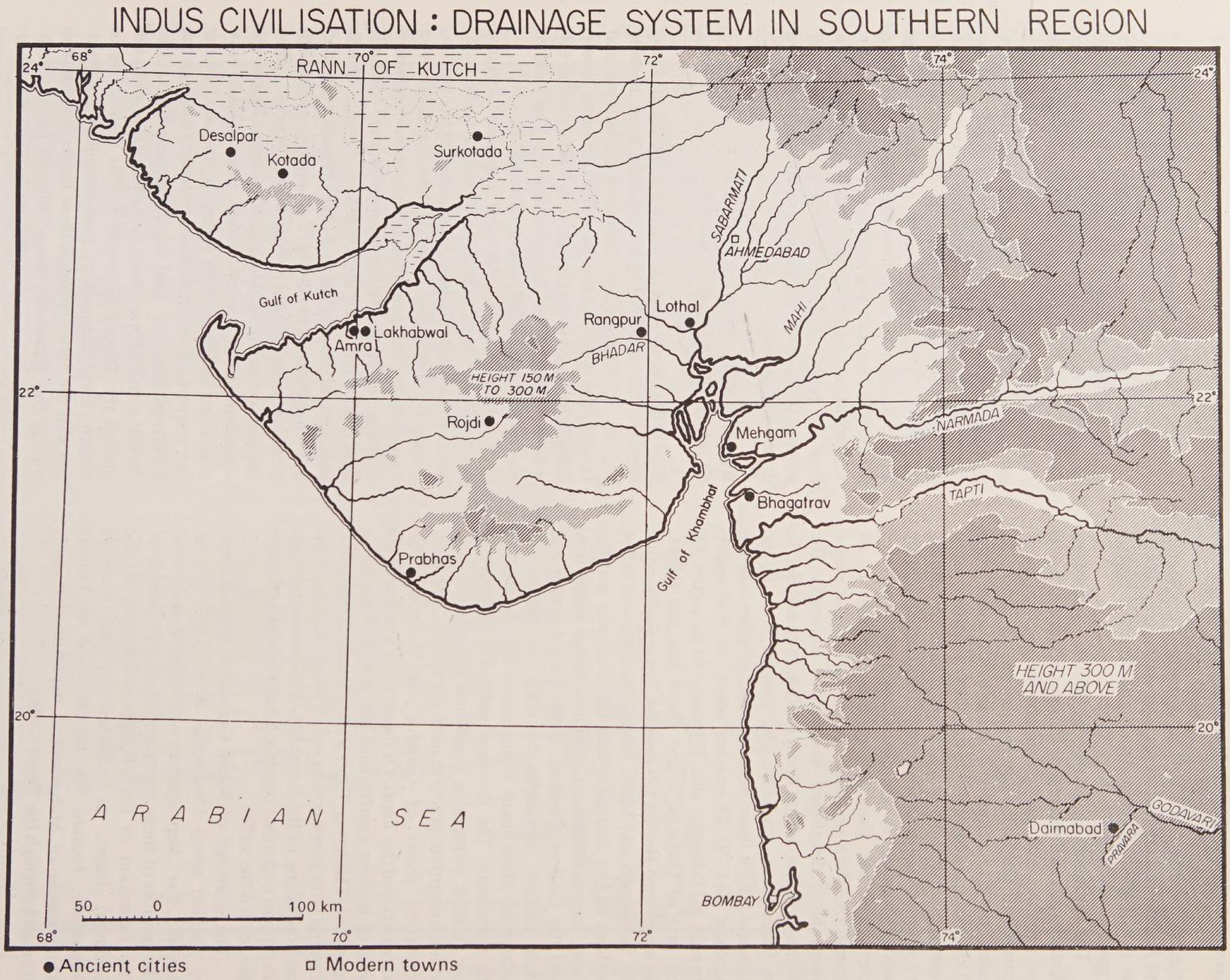
The drainage of South Gujarat is characterized by parallel rivers (Narmada, Kim, Tapti, Purna, Ambika, Par), kept apart by well-defined interfluves. The mouths of these rivers are affected by tidal flow. The extension of the Harappan influence to the Godavari basin, as reflected by the finds at Daimabad, located on the Parvara in District Ahmednagar of Maharashtra, would thus be only overland through the Tapti Valley.

Paleoclimatic studies have indicated an environment little changed from that of the present day. In fact, the surviving specimens of wood do not support the theory that a moist forest flourished during the Harappan times. As is well known, most of the research on this subject has been done in Rajasthan and Gujarat; but very few pollen diagrams are available. The evidence for the Indus Civilization is largely an extrapolation of this evidence and as such has to be evaluated with caution. An onset of aridity in the eastern region of the Civilization around 1800 B.C. (without affecting the southern regions) has also been postulated as a possible cause for the weathering of the Indus Civilization. I need not discuss here at length the climatic pattern of the Indus Civilization, for detailed studies are available by Gurdip Singh, Vishnu-Mittre and S.K. Seth. Suffice it to mention that the pollen diagrams for the last 10,000 years portray only minor fluctuations within the prevailing dry or arid climate.

RESOURCES AND COMMUNICATION SYSTEM

Sind is devoid of useful minerals except salt, and thus metals of all sorts had to be imported from the hilly regions of Afghanistan, Baluchistan, Makran and Iran on the west and the Aravallis and other mountains in the east. Its chief asset is a rich alluvial soil which requires little tillage or manuring to yield at least one crop annually along with fodder.

Coming to resources and subsistence-related material like chert, sandstone, basalt, granite, slate, bitumen, lapis lazuli, jade, turquoise, copper and tin, it may be stated that some of these items involved long-distance trade through either simple or complex exchange systems. Beginning with copper, one finds that Oman has been mentioned as a source of this Indus metal, largely because of the presence of nickel as a trace element in the ore of the region and the high nickel content in Indus copper-bronze objects. Other copper sources indicated are the Garden Reg in the southern part of Afghan Seistan. Copper could have also been obtained from Khetri as revealed by the comparison of the trace impurity pattern between the Khetri copper mines and the Harappan artifacts. The find of a rich copper-using culture, ascribable to the end of the third millennium B.C., at Ganeshwar in District Sikar (Rajasthan), further supports the possibility of the exploitation of these mines in Rajasthan during the Harappan times. Interestingly enough, Ganeshwar is located in the Drishadvati (Ghaggar-Hakra-Wahinda) system and as such is connected



INDUS CIVILISATION : DRAINAGE SYSTEM IN SOUTHERN REGION

RANN OF KUTCH
Desalpar
Kotada
Surkotada
Gulf of Kutch
Lakhabwal
Amra
HEIGHT 150 M TO 300 M
Rojdi
Prabhas
Rangpur
BHADAR
Lothal
SABARMATI
AHMEDABAD
MAHI
NARMADA
Mehgam
Gulf of Khambhat
Bhagatrav
TAPTI
HEIGHT 300 M AND ABOVE
Daimabad
GODAVARI
PRAVARA
BOMBAY
ARABIAN SEA
50 0 100 km
68°
70°
72°
74°
24°
22°
20°
● Ancient cities
□ Modern towns

Fig. 4. Indus Civilization: Drainage system in southern region.

with other sites in the same system.

Tin is known to occur in Central Asia, particularly in Farghana, the eastern part of Kazakistan and in Iran. Tin ore deposits are also known to occur in many parts of India: particularly Rajasthan, Gujarat, Bihar and Karnataka. In the context of the present enquiry, one is perhaps concerned with the ore deposits in Rajasthan and Gujarat which may have been exploited during the Harappan times. In both regions these are found in the Aravalli hills: in districts Bhilwara and Udaipur in Rajasthan and in District Banas Kantha in Gujarat. This is particularly significant because of the occurrence of chalcopyrite deposits in the Aravallis. Lapis lazuli is known to occur in the Badakshan region of northeastern Afghanistan. The existence of Harappan pottery and a seal at Shortugai in the Oxus basin confirms the source of Indus lapis lazuli. Turquoise was probably obtained from Khorasan in northeastern Iran and jade from eastern Turkistan. Chert and flint were obtained from the outcrop near Rohri and Sukkur, while the other useful material for querns, mullers, etc., could be obtained from the highland areas. For Sind, the mineral-rich areas were to the west and the north in the hilly regions of Baluchistan and Afghanistan. For the Punjab they were to the northeast in the lower Himalayas including the Aravallis. Steatite, fine-grained yellow Jaisalmer stone and dark gray slate seemed to have come from Rajasthan. Construction timber like pine (*Pinus roxburghii*), deodar (*Cedrus deodar*) and elm (*Ulmus* sp. near *lancifolia*) were doubtlessly transported from the Himalayas. All these resources indicate the mechanism for trade and the routes through which exchange took place. The absence of settlements along a route may not necessarily imply that the route was not used.

Environment and terrain very often determine the lines of communication. The routes followed natural passes, the rivers and hill-streams, or *nais*. Internal communication between the Punjab, Rajasthan and Sind seems to have been largely via rivers, and between Sind and Gujarat, by both land and sea. Sind had access to a greater number of long-distance trade routes through Kirthar, Baluchistan, Kohistan, etc. There are various notches in the folds of the Sulaiman-Kirthar ranges which were utilized as trade routes in the past: the Gomal and Bolan Passes for Seistan and Turkistan across Kandahar and the Hari Rud; the Mula Pass for Central Persia; the Lak Phusi for Makran Baluchistan and Tiz-Lasbela across the Hab which the Arabs used in the eighth century. Besides, the complex folding of the Hindu Kush mountains also afforded some openings on the northwest. Punjab and Rajasthan's trade of greater complexity seems to have taken place via the Indus. This is an important factor to recognize while considering the circumstances for the collapse of the Indus Civilization. Some of the trade was carried out directly, while some was through a middle man.

ANALYSIS OF THE EVIDENCE

From the foregoing it is apparent that the Indus basin evidently provided a significant challenge which seems to have provoked a creative response for the growth and spread of the Harappan Civilization. In bringing the alluvium under cultivation the Indus people produced a surplus which indeed was small and reserved perhaps for use by the privileged minority, and in turn became the economic basis for the differentiation of classes. Human control of the alluvium must have been planned by leaders who had the imagination to work for returns, for they had calculated that the productivity of the alluvial silt would provide the establishment with means of living in comparative affluence, if not leisure. Linked to the emergence of Indus cities are increased levels of specialization of labor; the concept of trade, probably with a medium of exchange; innovations like writing, and that too of an individualistic kind; and the form of monumental architecture.

The settlement pattern during the Indus Civilization was conditioned by: (1) the behavior of the river affording an active and cover flood-plain; (2) navigability of the river, permitting transport for internal trade; (3) climate; (4) accessibility to natural resources and the location on trade routes, including those involving long distances. The expansion of this civilization is explained by the urge to seek out familiar environmental conditions and reach the limits of one ecological zone. The key pieces of land were those that afforded portage from the sea or from one navigable river to the other. Although the seaport stations did develop into urban complexes, their development was conditioned more by strategic location for trading than by the ecological factors. Sites like Manda, Ropar, Gumla, Rahman Dheri, Pandi Wahi, Ali Murad, Damb Bhuti, Hisham Dheri, Nowsharo, Allahdino, Sutkagendor and Lothal are examples of such a pattern. Manda and Ropar were nearest to the source of teak from the Himalayas; Gumla and Rahman Dheri were nearest to the mineral-rich areas; Pandi Wahi, Ali Murad and Damb Bhuti were in the Lake Manchar area; Judeirjodaro and Nowsharo were on the Kachi Plain; Allahdino was close enough to the traditional sea and overland routes; and Sutkagendor and Lothal were on coastal flats.

No sustained work has so far been done to substantiate or refute the central place theory in respect to the spatial spread of this civilization, excepting a rather presumptive suggestion that Mohenjodaro and Harappa represented provincial capitals respectively of the Sind and Punjab provinces of the civilization. In the light of the accruing evidence, this suggestion, however, does not seem to be valid. At the same time, it is seen that the central Indus system (covered by a rough triangle with Mohenjodaro, Kalibangan and Harappa as points) showed a greater concentration of large-sized sites and may thus be taken as the nuclear area of the civilization. We, however, do not as yet fully understand the relation which an Indus "city" maintained with village settlements. In fact no deterministic criterion, excepting perhaps size, exists to classify Indus sites into "cities" and "villages." It is widely known that the various items of cultural equipment of the civilization like pottery, chert weights and blades, copper-bronze objects, beads, terracotta cakes, toy cart-frames, bangles and animal figurines, faience objects, and above all the seals, are marked by an almost compelling standardization which makes it difficult to differentiate objects of the so-called "city" site from those of the village site. The difference is more in the scale or quantity than in quality. The only other apparent distinguishing feature of the city may perhaps be the planned layout and the concept of the citadel, including fortifications.

From the distribution pattern of the sites of the Pre-Harappan genre in the Subcontinent, it would appear that the limits of the ecological zones adopted by the Harappans in the Indus basin were already to a great extent known to their Pre-Harappan predecessors. This is evidenced by the occurrence of Pre-Harappan sites up to Gumla, Sarai Khola and Rahman Dheri in the Indus basin and a chain of Pre-Harappan sites including Sandhanawala, Chabbuwala Ther, Kudwala, Kalepar and Derawar along the ancient course of the Hakra. Then there are Kalibangan, Banawali, Dhalewan, Lakhmirwala, Gurnikalan and Balu in the Sarasvati Valley, and Siswal and Mitathal in the Drishadvati. The credit for responding to the challenge offered by the rivers of the Indus and Hakra system should, therefore, rightly be given to these people. The Harappans perhaps exploited the environments to their best advantage, favorably placed as they were in their organization and better technology.

As pointed out, environmental factors, including the behavior of the river, climate and accessibility of natural resources, were largely responsible for the growth into maturity and expansion of the Indus Civilization. Paradoxically, it is these very factors, in a multicausal framework, which became responsible for the weakening and ultimate collapse of the Indus Civilization. Long distance and internal trade in resource material was badly disturbed, affecting the distribution of raw materials and luxury goods, with the result that the settlements of the far-flung civilization became impoverished in cultural content. Shifts in drainage patterns occurred, resulting from extended pluviality in association with geomorphic changes, either through "westering" or through "northering." The Ghaggar-Hakra-Wahinda system disappeared due largely to the capture of the Yamuna by the Gangetic system. There was wholesale destruction of forests and intensive grazing in the Himalayan foothills. This led to erosion and to the wandering of the water channels due to the raising of their beds through the deposition of detritus. Tectonic disturbances, (1) made the Indus prone to frequent flooding, resulting in the ponding of some parts and consequent rise of the water table in the area, and (2) disrupted the Ghaggar-Nara flow channel, as is evident by the reverse gradient of the river near Manot, resulting in reduction in the supply of water. Eustatic phenomena (coastal uplifts or marine regressions) took place along the northern margin of the Arabian Sea with the result that, (1) some of the old ports, both on the Makran and Kutch-Kathiawad coasts, were left several kilometers inland, and lost their trading role, and (2) the water table receded on inland sites, leading to a decline in civic standards. In the context of environmental syndromes, it would be seen that the phenomena of eustasy, pluviality and aridity produced different reactions in the different physiographic regions, which would perhaps explain the survival and variability of the Indus Civilization in regions like Gujarat, Haryana, the Punjab and contiguous areas of Uttar Pradesh during the first half of the second millennium B.C.

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GREGORY L. POSSEHL

The Harappan Civilization: A Contemporary Perspective

INTRODUCTION

THE most significant intellectual achievement of prehistoric archaeology in the twentieth century has been the emergence of a positivist approach to the past which eschews the impressionistic in favor of the rigor and intensity of systematic research. This has led to the development of explicit research designs which raise intuitive assumptions to a conscious level where they can be critically evaluated. The execution of these research designs has led to rigorous attention to sampling problems, intensive horizontal excavation, and a much-expanded definition of the data which apply to the human past. This is especially true of our awareness of the role which archaeobiological materials can play in understanding past human adaptations. Of equal, if not greater, importance is the realization that archaeological sites and settlement patterns are structures of past ways of life and can be read within their own context. In a real sense the study of the Harappan Civilization has come across this threshold separating the impressionistic from the explicit. There is certainly a vitality to the initiation of new research, if the number of reports on recent field work found in this volume are an indication.

SETTLEMENT PATTERNS

It is no surprise that most of the reports in this volume relate directly to the "mainline" Harappan theme. Dales' report on a little-known excavated area at Mohenjodaro, the so-called Moneer site, is typical in this regard. He even discusses the "downtown" area of the site. The point developed is an interesting, and important one: the notion that the whole lower town at Mohenjodaro can be reconstructed as a reproduction of the classic excavated areas, especially the DK sample, is not very precise, or useful. The Moneer site, although excavated under almost appalling conditions, would seem to be significantly at variance from the DK area in both architecture and some aspects of function. Drawing attention to this part of Mohenjodaro is significant in itself, and one is certain to know much more about it when Dr. Michael Jansen (1979) completes his detailed mapping of the site.

Harappa, the somewhat neglected giant, is an extraordinarily difficult city with which to deal. This is, in part, due to the fact that it was so thoroughly dismantled by railway builders in the nineteenth century. There are simply not very many areas of the site which appear to have a potential for rewarding excavation, but Harappa sits in a rather interesting isolation—a point noted in the papers by S. Ratnagar and M. Fentress in this volume, as well as one of my own (Possehl 1979a). The map (Fig. 1) shows that there are no Harappan sites in the Punjab to the west of Harappa, and it is not as though there has been an absence of exploration in the region. A point, again, covered by me earlier (Possehl 1979a). I am not suggesting that all of the exploration that needs to be done in this region has been completed. But there are many sites of the historic periods known in the area, and a number of competent people—Aurel Stein, A.H. Dani, M.R. Mughal, M.S. Vats to name a few—have worked here. They have been able to find a large number of sites, but none of them is Mature Harappan. There are even Early Harappan sites:

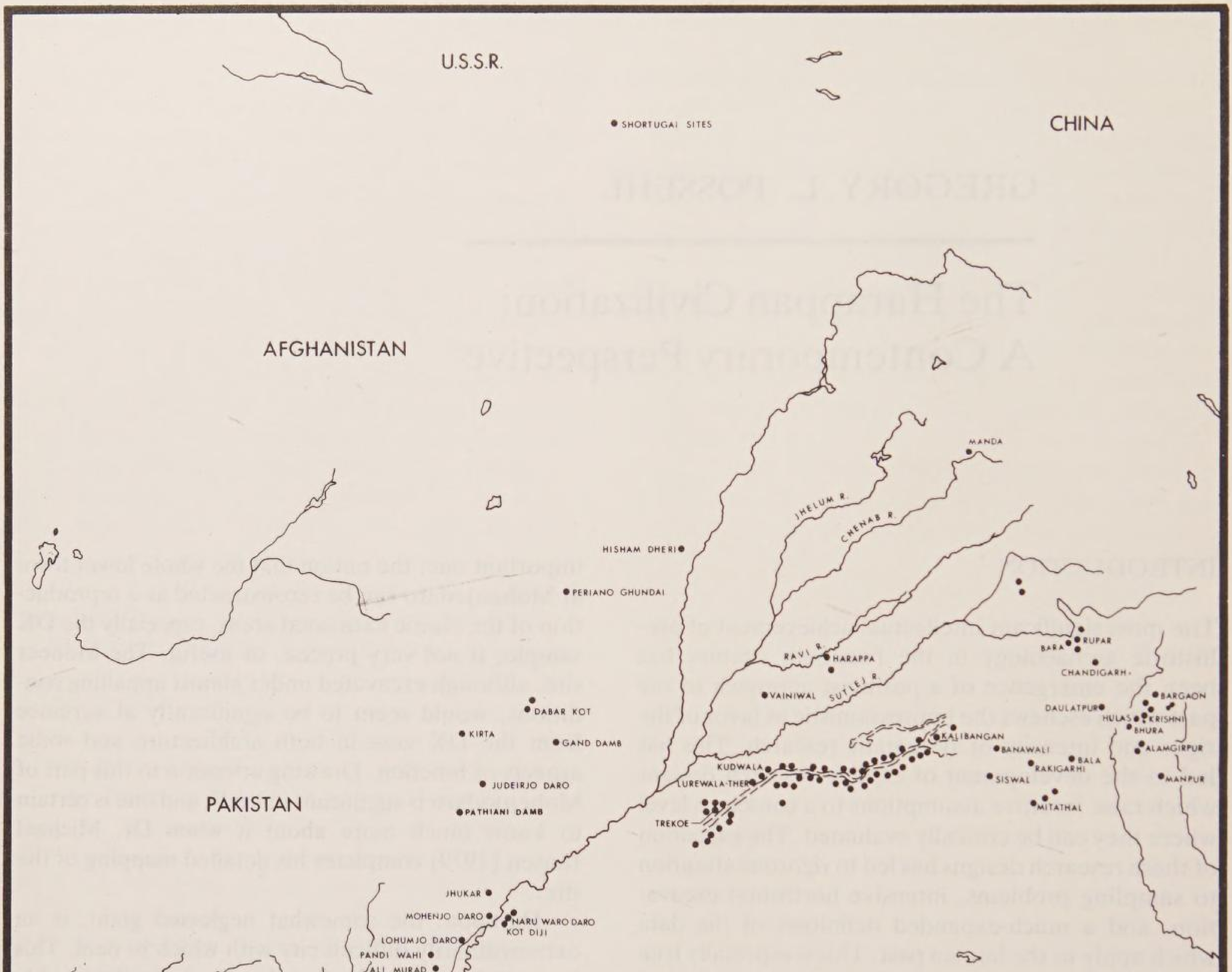

U.S.S.R.
SHORTUGAI SITES
CHINA
AFGHANISTAN
MANDA
JHELUM R.
CHENAB R.
HISHAM DHERI
PERIANO GHUNDAI
RAVI R.
HARAPPA
SUTLEJ R.
VAINIWAL
BARA
RUPAR
CHANDIGARH
BARGAON
DAULATPUR
HULAS
KRISHNI
BHURA
ALAMGIRPUR
DABAR KOT
KIRTA
GAND DAMB
KALIBANGAN
BANAWALI
BALA
RAKIGARHI
MANPUR
KUDWALA
LUREWALA-THER
SISWAL
MITATHAL
JUDEIRJO DARO
PAKISTAN
PATHIANI DAMB
TREKOE
JHUKAR
MOHENJO DARO
NARU WARO DARO
KOT DIJI
LOHUMJO DARO
PANDI WAHI
ALI MURAD
GHAZI SHAH
GORANDI
AMRI
CHANHU DARO
SUTKAGEN DOR
SOTKA KOH
KARCHAT
BALA KOT
INDIA
ALLAHDINO
GHARO BHIRO
ARABIAN SEA
SABARMATI R.
KOTADA DHOLAVIRA
SURKOTADA
DESALPUR
TAPTI R.
DISTRIBUTION OF HARAPPAN SITES
LOTHAL
RANGPUR
NARMADA R.
0
200 KM

Fig. 1. Distribution of Harappan settlements.
Note: See the paper by M. Rafique Mughal in this volume for a detailed map of sites on the Ghaggar/Hakra and the contribution by M. Fentress torsites between the Sutlej and Yamuna.

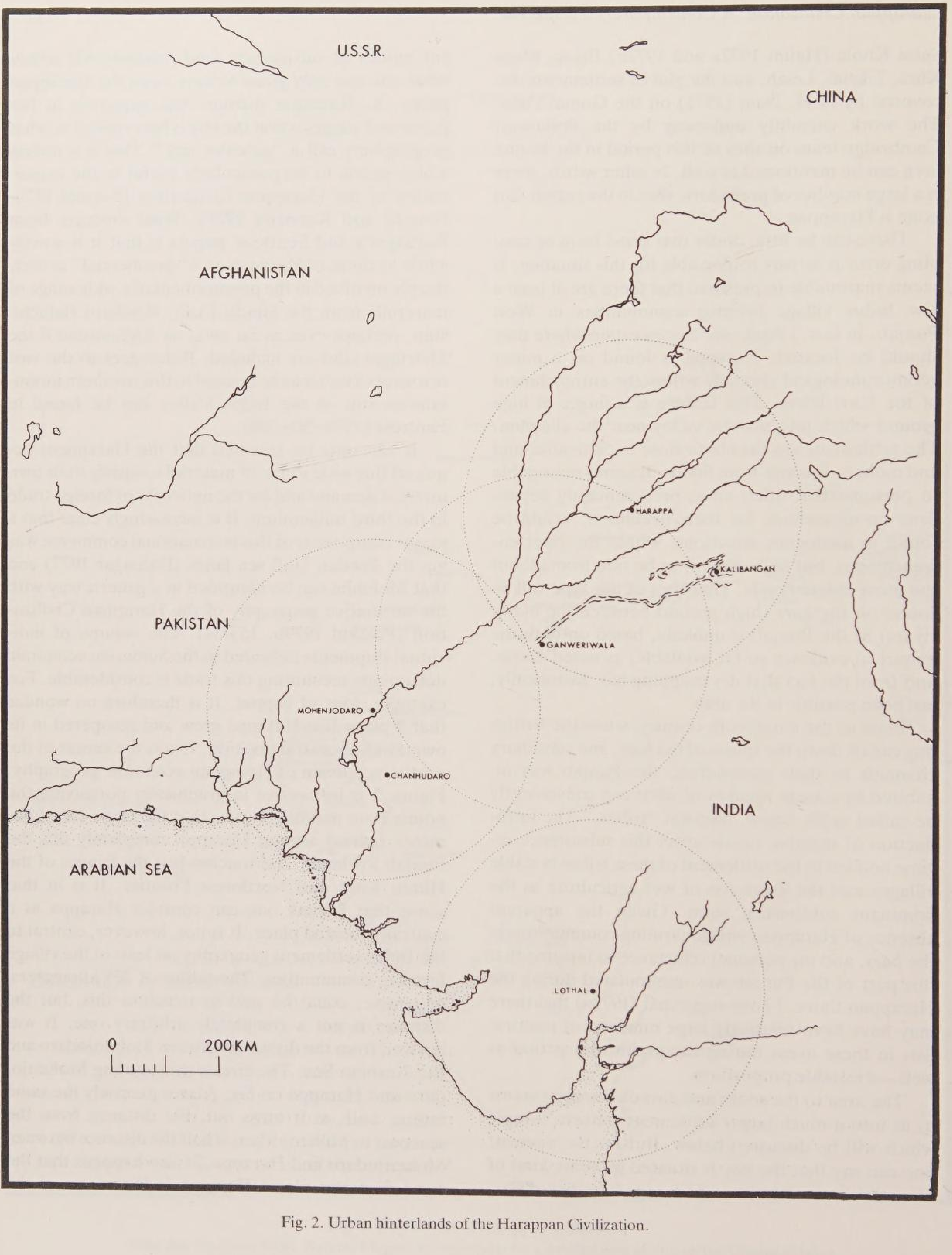
Sarai Khola (Halim 1972a and 1972b) Jhang, Musa Khel, Tikrial, Leiah, and the glut of settlements discovered by A.H. Dani (1971) on the Gomal Plain. The work currently underway by the Peshawar/Cambridge team on sites of this period in the Bannu area can be mentioned as well. In other words, there is a large number of prehistoric sites in the region, but none is Harappan.

There can be little doubt that some form of sampling error is in part responsible for this situation. It seems reasonable to presume that there are at least a few Indus village farming communities in West Punjab. In fact, I think one can ascertain where they should be located. Harappa is found on a minor geomorphological anomaly within the entrenchment of the Ravi River. This feature is a finger of high ground which juts into the valley near the alluvium. The settlement was thus both close to cultivable land and more or less safe from floods. It seems reasonable to presume that other sites, predominantly dependent on agriculture for their livelihood, would be found in analogous situations: within the river entrenchment, but high enough to be safe from all but the most severe floods. That sites of this type will be found on the *bars* (high ground between the major rivers) of the Punjab is unlikely, based on both the empirical evidence so far available, as noted above, and from the fact that dry cropping has, historically, not been possible in the area.

Prior to the nineteenth century, when the British dug canals down the spines of the *bars*, and subsidiary channels to their peripheries, the Punjab was inhabited by a large number of what can conveniently be called cattle based, pastoral "tribes." The introduction of massive canals upset this subsistence regime and led to the settlement of these tribes in stable villages and the ascension of wet agriculture as the dominant subsistence form. Given the apparent absence of Harappan village farming communities in the *bars*, and my personal reluctance to imagine that this part of the Punjab was unpopulated during the Harappan times, I have suggested (1979a) that there may have been relatively large numbers of pastoralists in these areas during the prehistoric period as well—a testable proposition.

The area to the south and east of Harappa seems to fit into a much larger settlement context; a topic which will be discussed below. But for the moment one can say that the city is situated on some kind of "frontier," possibly one which separates two different modes of subsistence (and production?) *within* what one can only guess to have been the Harappan polity. S. Ratnagar pursues this approach in her paper and suggests that the city is best viewed as what geographers call a "gateway city." This is a notion which seems to be particularly useful in the examination of the Harappan Civilization (Possehl 1976; Possehl and Kennedy 1979). What emerges from Ratnagar's and Fentress' papers is that it is worthwhile to think of Harappa as a "commercial" center, deeply involved in the procurement of a wide range of materials from the Hindu Kush, Northern Baluchistan, perhaps even as far away as Afghanistan if the Shortugai sites are included. References to the vast resources known to be located in this northern mountainous rim of the Indus Valley can be found in Fentress (1976: 306-309).

It can only be assumed that the Harappans acquired this wide range of material to satisfy their own internal demand and for the networks of foreign trade in the third millennium. It is increasingly clear that a major component of this international commerce was via the Persian Gulf sea lanes (Ratnagar 1977) and that Meluhha can be identified in a generic way with the normative geography of the Harappan Civilization (Possehl 1979b: 153-54). The volume of individual shipments indicated in the Sumerian economic documents recounting this trade is considerable. For example, tons of copper. It is therefore no wonder that a place like Harappa grew and prospered in its own kind of central position. It was the center in the northern domain of Harappan economic geography. Figure 2 is instructive in graphically portraying the points I am making. Notice that the circle (325 kilometer radius) around Harappa completely fills the Punjab lowlands, and touches just the fringes of the Hindu Kush and Northwest Frontier. It is in that sense that I think one can consider Harappa as a centrally located place. It is not, however, central to the Indus settlement geography; at least of the village farming communities. The radius of 325 kilometers, of course, could be said to structure this, but the distance is not a completely arbitrary one. It was derived from the distance between Mohenjodaro and the Arabian Sea. The circles surrounding Mohenjodaro and Harappa on Fig. 3 have precisely the same radius, and, as it turns out, the distance from the seacoast to Mohenjodaro is half the distance between Mohenjodaro and Harappa. It also happens that the same diameter places Harappa in the center of the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HARAPPA
KALIBANGAN
GANWERIWALA
MOHENJODARO
CHANHUDARO
INDIA
ARABIAN SEA
LOTHAL
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Fig. 2. Urban hinterlands of the Harappan Civilization.

Punjab lowlands and that the areas circumscribed have a slight intersection at the *panchnad*—the place where the five rivers form a single stream.

A newly reported site called Ganweriwala at 81.5 hectares is within the range of the Harappan cities as well (Mughal in this volume Fig. 7.1). It is essentially identical in size to Mohenjodaro (ca. 83 hectares) and larger than Harappa (ca. 65 hectares). City planning at Ganweriwala includes the normative Harappan design of an elevated "citadel" adjacent to a larger lower town, apparently the residential area of the settlement. The location of this third Harappan city just to the southeast of the *panchnad*, precisely midway between Mohenjodaro and Harappa would seem to figure prominently in the Harappan urban geography, not only as an intermediate settlement between the classic city sites, but as a place through which the Harappans may have been drawing on the resources of Rajasthan and possibly places like the important copper-producing site of Ganeshwar (Agrawala and Kumar in this volume).

This is hardly the time to deeply involve myself in an exercise on locational geography (Haggett 1976) so suffice it to say the settlement locations where growth takes place are those that best satisfy, or "average" a series of competing positive and negative forces. These forces are numerous, varied, and not limited to things such as: routes of communication, subsistence base, resource location, defense, surrounding settlements and populations, geomorphology and biotic considerations. As Dr. Ratnagar points out, Harappa is located at an important river crossing and at a node where several traditional routes converge. Its equidistant position vis-a-vis the resources in the mountains from the Sulaiman Range through the Hindu Kush is another factor which makes the notion that Harappa was deeply involved in the procurement of "exotic" materials an eminently reasonable one.

An analogous position can be developed for the location of Mohenjodaro, which, again noted by Ratnagar and even by Asthana, is not clearly surrounded by a settlement grid of village communities. It is, however, advantageously located near both the resources of Baluchistan and Rajasthan. At the same time the inhabitants could take advantage of the Indus-given fertility of the Larkana flood plain.

The location of Lothal (Possehl 1976, Possehl and Kennedy 1979), and the character of this extraordinarily interesting community, make it appear that it too was a procurement, "trading" center. This small, well-organized settlement was probably the least generalized of these three sites in terms of its function and there is little doubt that it was strategically placed, again on a frontier, in a position to gain Harappan access to the resources of southern Rajasthan, or the Deccan.

Returning to the major centers, Mohenjodaro, Harappa and Ganweriwala, one sees that the locations of the cities can be understood, at least in part, by thinking in terms of two principal, but opposed variables. The sites were in some form of interaction and this pull, basically a drive to minimize the "friction" or "work" caused by distance, was a force tending to pull the location of the centers together. On the other hand, the dispersed nature of the resources in which their inhabitants were interested—from the Hindu Kush through Rajasthan to the Deccan and the Aravallis through Baluchistan and the Northwest Frontier—drove the optimum position for the settlements away from one another. Lothal, the third settlement of interest in this regard, can now be seen as an outlier of Mohenjodaro—a settlement daughtered-off to capture the resources from a very specific terrain. This sense of Lothal is perfectly in keeping with the size and specialized character of the settlement. The site is not simply a miniature Mohenjodaro, or Harappa.

It may be wise at this time to offer something of a disclaimer. By pursuing these points having to do with trade, natural resources and the like I do not intend to imply that the Harappans were single-minded of purpose, or that every important, or even interesting, thing about these ancient peoples is somehow related to commerce/economics. There are many other things to be learned about the Harappan Civilization and some of them will be touched on later in this essay. But economics is interesting, too, and looking at the civilization in this way suggests that there is a basis for partitioning Harappan geography.

HARAPPAN DOMAINS

The internal structure of the Harappan Civilization has never been well understood. It is clear, however, that an area as large as the one inhabited by the Harappans, roughly the size of France, must have been differentiated into subunits, possibly as a nested hierarchy. The maps (Figs. 1 and 2) suggest an approach to uncovering the outlines of this structure.

That is, by taking the distribution of sites and noting the location of the presumably dominant cities and towns it may be possible to begin to sense something of the internal structure of the Harappan cultural landscape. Figure 3 is a first approximation of this organization.

It should be emphasized that these proposed units cannot be said to represent the Harappan equivalent of a "province" or "district" or any other formal political unit. In fact, they represent the blending of points of cleavage between major geographic features (e.g., the Kirthar Range, the Thar Desert and the Western Ghats), settlement clusters and the distribution of the largest of the Harappan centers.

Selecting an appropriate terminology for such units presents a problem since the usual run of words carries with it denotative and connotative suggestions of institutional configurations clearly not present in this rendering of Harappan geography. Terms such as state, province, district, and realm, plus many others, carry with them a distinct meaning relating to political geography, not justified in the present case. A word with a more neutral meaning is required to ensure that misconceptions are not developed and perpetuated. After some thought and search I have selected the term "domain" as an acceptable, not necessarily ideal, choice. One disadvantage to this term is that in one of its forms it carries a political meaning relating to sovereignty and the rule of a state. But, there are other sets of meanings which are different from this and which provide an acceptable usage for our purposes. These relate to a sphere of activity or influence without a specific institutional setting being involved, as in this or that domain of action or a city's domain as a hinterland. Granted, the term is not without its drawbacks if it is to be used to designate subdivisions of Harappan space, but it seems to me to be better than many of the alternatives that might be offered.

If the selection of the term to designate Harappan geography is difficult, naming the individual units is relatively easy. There seem to be two directions which one can take in this matter. The first is to designate each unit with a directional term (e.g. north, south, central, etc.). This tack is the safest, if dullest alternative. The second direction to take is to christen each unit with a recognizable geographic name, modern or ancient, a settlement or a region.

My preferences tend toward the second alternative since the terminology is significantly richer than the first, with one exception. The first domain, that to the east of Harappa in East Punjab, Haryana and western Uttar Pradesh does not seem to have a particularly appropriate modern or ancient regional name, and none of the major excavated sites seems to be appropriate. Kalibangan, unfortunately, is in a possible border area and could well be within the Bahawalpur Domain. Haryana is simply not broad enough in scope to be truly appropriate. Thus, "Eastern Domain" will have to suffice that area. My candidates for the other regions are as follows: Harappa Domain, Bahawalpur Domain, Mohenjodaro Domain, Gedrosia Domain, Lothal Domain.

Directional	*Geographical*
1. Eastern Domain	Haryana (Kalibangan) Domain
2. Northern Domain	Punjab (Harappa) Domain
3. Central Domain	Bahawalpur (Ganweriwala) Domain
4. Southern Domain	Sindh (Mohenjodaro) Domain
5. Western Domain	Gedrosia (Kulli/Harappan) Domain
6. Southeastern Domain	Gujarat (Lothal) Domain

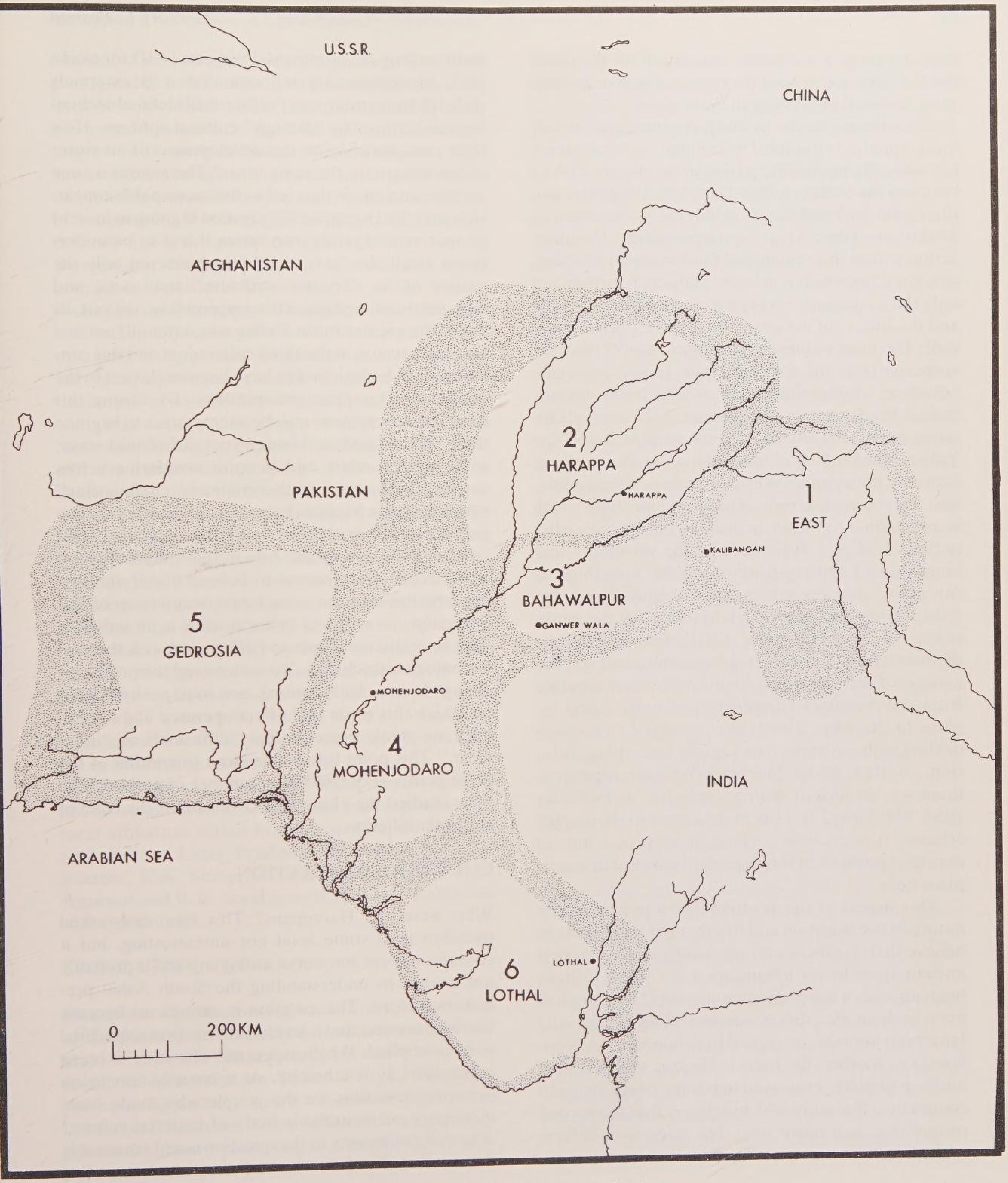
THE BAHAWALPUR DOMAIN

One of the most significant discoveries relating to the Harappan Civilization is that made by M. Rafique Mughal in the fomer Bahawalpur state. His paper in this book outlines these finds in a preliminary way, as one awaits the full publication of his material in a forthcoming number of *Pakistan Archaeology*.

It can be said for the moment that Mughal's discoveries have isolated an area with a spectacular density of protohistoric settlements. Clearly, this was the, or one of the, centers of Harappan sedentarism. Figures 7.1 and 7.2 will give some impression of this. It is too early to fully understand the full significance of his work; however the Bahawalpur Domain now stands as a contrast to the openness of the remainder of the Harappan settlement grid, especially in West Punjab (Possehl 1979a).

CIVILIZATIONAL PROCESSES

Several papers in this volume address the issue of site distribution. While time and geography are different in most of these papers, several authors are concerned with an abstract problem about the nature of urban systems. For example, S.P. Gupta and C.C. Lamberg-Karlovsky both begin with observations of patterns and then develop these in a way which causes a new, interesting aspect of urbanism to emerge. If


U.S.S.R.
CHINA
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PAKISTAN
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HARAPPA
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EAST
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BAHAWALPUR
GANWER WALA
5
GEDROSIA
MOHENJODARO
4
MOHENJODARO
INDIA
ARABIAN SEA
LOTHAL
6
LOTHAL
0
200KM

Fig. 3. Domains of the Harappan Civilization.

Note: The stippled areas between the individual domains are intended to indicate the area within which an actual border may have been located.

they cannot give a concise explanation for the material they discuss, at least they succeed in giving something new and interesting to think about.

This theme serves to sharpen something already quite apparent: the third millennium B.C. was an extraordinarily interesting period in the history of Asia between the valleys of the Tigris and Euphrates and the Great Indian Desert, extending as far north as Turkistan. There is an apparent vitality of interaction within this region and the formation of states, or something which is at least "state-like," within not only the traditionally accepted areas of Mesopotamia and the Indus but in Central Asia and Eastern Iran as well. The most visible archaeological sign of this convergence is in the form of trade goods, especially "esoteric" commodities such as lapis lazuli, metals, etched beads, stamp and cylinder seals, even elaborately carved chlorite vessels such as those from Tepe Yahya. The last half of this millennium, the apparent focus of Harappan urbanism, is a period of consolidation of a complex web of interrelationships which were begun, or at least intensified, during the earlier period. Just as I am struck by the possibility that Gupta and Lamberg-Karlovsky have something to say about the way civilizations "behave" at some level, so too am I compelled to think that the emergence of the Harappan Civilization cannot be divorced from this larger geographic context. The genesis of the Harappan Civilization is not separate from the processes attendant upon neighboring regions to the west. This is not to suggest that one is dealing with anything even vaguely resembling diffusion, or that, as Sir Mortimer Wheeler suggested, there was an *idea* of civilization in the air (Wheeler 1959: 104; 1968: 25). I have taken pains to thoroughly critique this elsewhere (Possehl in press) but an abridged position of this argument may not be out of place here.

One aspect of this position develops around the nature of urbanization and whether it is reasonable to believe that: (1) there ever was a sufficiently coherent ancient thought on urbanization for there to have been an *idea* of the phenomenon, and (2) if there had been such an idea that it was something which could have been inserted, or applied from one area (Mesopotamia) to another (the Indus). There is a great deal of anthropological, even contemporary developmental economics, literature which suggests that the second proposition is a naive one. The numerous failures which could be recounted in areas such as the twentieth century developmental projects (AID for example), unambiguously tell one that it is extremely difficult to transfer even rather well-defined technological features to "foreign" cultural spheres. How then can one imagine the development of an entire urban system on the same basis? The answer is, one cannot, and one is thus led to the inescapable conclusion that the Harappan Civilization is going to have to be understood on its own terms if it is to be understood at all. Its "own terms" includes not only the nature of its "interior structure" but social and cultural relationships with surrounding regions as well. The greater Indus Valley was, after all, not in a cultural vacuum in the third millennium and this context cannot be assumed to have been irrelevant to the history of Harappan urbanization. By raising this issue, however, there may be a temptation to begin to think in old fashioned (simplistic) diffusionist ways, with cultural traits and peoples wandering across various landscapes indiscriminately "influencing" whomever else happens to be around. Culture change just does not work this way. Even assuming that "diffusion" played some role in this culture history, and there is every reason to believe that it did, one must realize that the acceptance or rejection of any particular, or mass, of cultural traits is an independent operation of cause and effect, just as is the case for ontogenetic change. To understand the process of change in an holistic context, one must seek the basis on which this cause and effect operated and not fall back on weak concepts like "diffusion" or "influence." This point brings one close to another of the focal points addressed by a number of authors who have studied the Harappan Civilization: the issue of cultural affiliation.

CULTURAL AFFILIATION

Who were the Harappans? This frequently-asked question is at some level not uninteresting, but it contains a great amount of ambiguity and is probably not *central* to understanding the South Asian prehistoric record. The question is ambiguous because there is no sense that a level of abstraction is specified or even implied. Which aspect of "who-ness" is being addressed? Is it ethnicity, or a contribution to an historical tradition, or the people who made some distinctive or identifiable body of material culture? After all, an answer to the question could reasonably be stated as: The folk who built the places now called

Mohenjodaro and Harappa among others. But, I suspect that that is not the form an answer should take, at least for some. I suspect that the question really being addressed has something to do with affiliation and origins, with an implication of a search for ethnic connections. It may even be true that the question has to do with a search for the area(s) from which the Harappans might have migrated. Again, this is not an entirely unworthy problem; although most current thought on Harappan origins has concluded that a migration hypothesis for the genesis of the Mature Phase of the Harappan Civilization has little substance. Equally to the point is the fact that problems of this kind have proved impossible to solve given a purely archaeological context. Even with a substantial corpus of written historical material this problem can pose serious difficulties. I refer here to the Sumerian/Akkadian groups in ancient Mesopotamia and the immense difficulties scholars have had in dealing with that situation in all its complex reality in spite of the almost overwhelming corpus of texts. Thus, archaeological questions of this kind are best worked on within a theoretical/methodological context. Certainly these methods are not available today since it is obvious that correlations between ceramics and historical presumptions about ethnicity are an inconclusive test. There is simply an overwhelming mass of ethnographic and historical data which indicate that material culture does not correlate with ethnicity in spite of the fact that there are occasional instances where these paths do cross (see Gupta 1969 for an interesting example).

One of the domains of the Harappan Civilization about which much has been said with regard to cultural affiliation is that in the east: Punjab, Haryana and western Uttar Pradesh. The papers by Y.D. Sharma, K.K. Sinha, S.P. Gupta, R.S. Bisht, D.P. Agrawal and R.K. Sood as well as K.N. Dikshit deal with this domain.

THE EASTERN DOMAIN

One of the most interesting issues in the archaeology of the Harappan Civilization is concerned with the many sites of this cultural tradition which have been found in northwestern India: Punjab, Haryana, northern Rajasthan, western Uttar Pradesh, even Jammu and Kashmir. Some of these sites have been known for many years (e.g., Alamgirpur, Ropar, Bara and Kotla Nihang Khan) but recent work has led to the discovery of scores more. The maps provided with the papers by Y.D. Sharma, K.N. Dikshit and M. Fentress will give a fair indication of the scope of these discoveries. They may also be used in conjunction with Fig. 1.

There were early notices of Harappan sites in this region (Vats 1929–30) but the work substantively begins in the years immediately following partition, with the exploration of the Sarasvati by A. Ghosh (1952) the excavation of Ropar, Bara, even Hastinapura (IAR 1953–54; 1954–55a; 1954–55b; Lal 1955) as well as with the initiation of a number of other programs.

Four things were apparent by the mid to late fifties. First, the initial penetration of the region between the Sutlej and the Ganges by food-producing village farming communities was somehow connected to the Harappan cultural tradition. Second, evidence from sites such as Sothi, Kalibangan and Bara indicates that the first food producers arrived prior to the emergence of the Mature, Urban Harappan. The scope of this settlement process (migration?) was later expanded (Suraj Bhan 1973) with the discovery of the Siswal complex, and sites such as Manda (Joshi and Madhu Bala in this volume). Third, in addition to the Pre- or Early Harappan occupation, there was evidence for the Mature Phase of the civilization, as well as a phase which seems to have followed the Urban Period. The second and later phase was often referred to as "Late Harappan." Fourth, it was evident that during this time the region was culturally complex in the sense that it was one within which there were several different ceramic styles in variable association with one another. The evidence from Ropar, formerly Rupar, further complicated this situation by indicating that the Pre- or Early Harappan ceramics occurred in association with Mature Harappan pottery (Dikshit in press). This association has also been found at Manda (Joshi and Madhu Bala in this volume). Bara Ware is also a long-lived ceramic, with Early Harappan motifs carrying through the entire sequence. This situation of variable ceramic associations in both space and time led to terminological and conceptual problems, many of which have yet to be resolved. It would be presumptive for me to suggest that an immediate solution to these problems is at hand; however some clarification of the situation is possible, as is a focus of attention on particular issues.

This discussion will begin with a descriptive statement of this recalcitrant body of material which draws liberally on Sharma (1973, and in this volume), Shaffer (in press), Suraj Bhan (1973, 1975) and Dikshit (in this volume).

The Early Harappan, as defined by Mughal (1970) has been recovered from Kot Diji and northeast along the Sarasvati to Kalibangan and beyond. It has also been found in excavation at Siswal and Balu (Suraj Bhan and Shaffer 1978), the latter site is currently being investigated by Kurukshetra University. There are at least 16 other Early Harappan sites in southern Haryana and northern Rajasthan. An examination of this so-called "Siswal A" Early Harappan can leave little doubt of its clear relationship to Kalibangan I and hence to the larger Pre-Urban Harappan phenomenon. These sites, which generally line the now extinct waterways of the region, represent a continuation of the Early Harappan settlement of the Ghaggar/Hakra (Sarasvati) apparently testing the limits of the wheat/barley/sheep/goat/cattle subsistence constellation (Fairservis 1961). There are good reasons for us to suspect that direct migration, and the founding of pioneer settlements, played a substantial role in this process since the pattern of relationships and discontinuity in the settlement and subsistence regime are so clear (Haury 1958).

The reasons for this Early Harappan penetration of the region have yet to be understood. It can be said with some certainty, however, that they did not involve the direct exploitation of minerals or semiprecious stones since the area is devoid of such resources. Timber may have been a draw to the area, and research directed to determining the potentials of forest cover in this, and other places, would be appropriate. It is also possible that at least a portion of the region's attractiveness lay in its proximity to the mountains of Rajasthan. The eastern fringe of the Thar Desert was apparently densely inhabited by peoples with complex, subtle forms of adaptation not the least of which may have involved working the rich copper deposits of their territories (see Agrawala and Kumar in this volume). It is worth mentioning that the extraordinary richness of these sites is not highlighted by simply labeling them "microlithic." One knows that places like Bagor (Misra 1973), Jodhpura and Ganeshwar (Agrawala and Kumar in this volume) are just three of a number of third millennium settlements with substantial importance for understanding the early metals economy. Since it is clear that there was a relationship between this region, especially the Khetri belt, and the Urban Harappans there is some reason, admittedly speculative, to suggest that the relationship began in the Early Harappan times and that the extension of sites along the eastern tributaries of the Sarasvati were in part involved in it.

The suggestion that the inhabitants of these settlements were involved in the early metals economy should not be taken as a proposition removing them from the remainder of a diversified economy. They must have been, at some fundamental level, subsistence farmers and herders.

Early Harappan penetration of the area to the east of the Sutlej was followed by the emergence of the Urban Harappan. In this eastern border area the older ceramic tradition seems to have continued. The clear sense of things is that the center of change (if it is fair to suggest a core area within which culture change held chronological priorities over peripheral areas) was to the west of this region.[1] This has been discussed elsewhere in some detail (Mughal 1970, and in this volume; Fairservis 1967; Possehl in press) and while greater chronological and contextual control over this material would be desirable, it does seem that the Harappa/Ghaggar/Mohenjodaro axis is the region central to the emergence of urbanism in western South Asia. In this sense the Siswal A sites can be thought of as provincial in character, with all that implies in terms of change. This contention is something of a speculative leap, especially given the historical understanding of this part of India during the third millennium. But it does, as a model to be tested, help in understanding the complex interweaving of older traditions and newly emerged features during the period when the Urban Harappan was apparently very much a part of life in the western Subcontinent.

Early Harappan ceramics and/or small finds are associated with Mature Harappan materials at Ropar IA, Siswal B, Mitathal I, Balu II, Manda and elsewhere. An association between the Mature Harappan and the Bara "Culture," of which more will be said in a moment, has been identified at Ropar IB, Kotla Nihang, Sanghol, and a number of other places. These have caused no small amount of confusion, especially when assumptions concerning ceramic types and ethnic groups have been made, but there is good reason to think of these associations as a phenomenon characteristic of provincial regions, hinterlands, or "rural" areas as suggested by a number of contributors to this volume. As is frequently the case in such areas, older traditions tend to be preserved. Examples of this can be found in many settings from the contemporary United States to many parts of India. Thus, rather than one of these sites being reconstructed in terms of the cohabitation of Early (or Pre-) Harappans and Mature Harappans as separate communities, it might be profitable to think in terms of the variably paced rate of culture change in these areas and the preservation of older, deeper, aspects of a tradition. This occurs not only through the keeping of heirlooms, but in terms of the contemporary manufacture of new examples of materials with older styles. These may be, from the perspective of those who make and use them, a fully legitimate part of what they would call "their culture." This conservative tendency is adequately accounted for within the provincial context which this region seems to reflect during the late third and second millennium.

This is not to suggest that ancient Haryana, the Punjab and western Uttar Pradesh are places that cannot be understood within their own context, or that these areas were unimportant during Harappan times. Indeed, the region between the Sutlej and the Ganges to the north of the Sarasvati is interesting to us because of its distinctive qualities within the larger setting of the Harappan Civilization.

One of the most interesting aspects of the Eastern Domain during Harappan times is the way in which the ceramic inventories were stylistically expanded. There are at least two assemblages—those from Bara and Siswal—which seem to diverge sufficiently from the norms established for Early (Kot Diji/Sothi) and Mature Harappan pottery to be deserving of special nomenclature. These assemblages, and there are probably others which might be formulated, have a consistent association with more straightforward, recognizable Harappan wares in the region. Nonetheless, they are a divergent element to be considered, and one which seems to tell something about the region, and this is fully congruent with the earlier noted association between Early Harappan and Mature Harappan elements. That is, the evolution of the distinctive Siswal and Bara ceramic traditions are not so much the result of new peoples appearing on the scene, or even the emergence of new "cultures," but of the provincialism mentioned earlier. Such divergence from what is recognized as "main line" Harappan norms is a reflection of attenuated (intensity and/or frequency) interaction. Using a linguistic model, the universal process of culture change led peoples to different answers to the same questions, especially in the plastic ceramic medium. The clear relationship that the Bara Ware and Siswal materials have with the Early and Mature Harappan can be interpreted in terms of these three cultural norms having a common heritage and the differences are then a result of independent, local culture change in an area relatively removed from the region within which the development of the distinctive Harappan style was created. Again, I propose that it was the attenuation of interaction, in terms of frequency and/or intensity, which gave rise to this independence of development in the Eastern Domain of the Harappan Civilization.

Another of the problems which needs intensified, systematic investigation in the Eastern Domain is the transition from the Mature Harappan to the Post-Urban Phase. There are many sites where this has been observed, and from which a clear sense of continuity of occupation exists. But, there is a shift at this time in the material inventory that is very interesting since it involves those features which are most clearly Mature Harappan: loss of the writing system, abandonment of the weights, shifts in the ceramic corpus, changing architectural styles and the like.[2] This shift has been widely and reasonably taken to be generally coincident in time with the transition between the Urban and Post-Urban Phases of the Harappan tradition. In the Eastern Domain one of the fossil indicators of this shift has been the Ochre Colored Pottery (OCP) which was discovered at Hastinapura and named by B.B. Lal (1955). Since that time there have been a number of discussions of this ceramic as well as at least one conference (Sharma 1971-72). It was recognized at an early date that there were significant parallels between OCP and Harappan wares, especially in vessel forms. The stratigraphic position of the pottery, immediately preceding Painted Gray Ware (PGW) at Hastinapura, made this eminently reasonable. However, the softness of OCP made it difficult to deal with since it frequently came to archaeologists as not much more than amorphous lumps of pottery. It has been suggested that this quality is due to waterlogging, which may, in fact, be the case. But, it is also related to the technology used to produce this ceramic since some sherds from the same soil environment are not so affected.

It quickly became apparent to those following the discoveries in the *Doab*, Haryana and northern Rajasthan that the term OCP was being indiscriminately applied to a number of archaeological assemblages which appeared to be quite different. This situation created confusion conceptually and terminologically, which only served further to obscure even the basic outlines of Harappan Culture history in this domain. The publication of Suraj Bhan's (1975) report on the excavations at Mitathal and Siswal has, however, provided a new body of information and the following draws liberally on the perspective presented there (Suraj Bhan 1975: 83-86, 111-15).

Suraj Bhan has proposed two basic types of OCP (1975: 113). The first of these is confined to the northern *Doab* and can be characterized by the kind of material found at Ambkheri (IAR 1963-64: 56). This type of OCP can be derived from a Mitathal IIB (Post-Urban Phase) aspect of the Harappan tradition. The exact typological parallels to support this contention can be found in Suraj Bhan (1975: 85). The second OCP variant is found to the south of this in the central *Doab* and adjoining parts of Uttar Pradesh, Haryana and Rajasthan. This OCP is best illustrated by the wares found at Atranjikhera and Saipai. Suraj Bhan claims that there are certain typological similarities between Kalibangan II (Mature Harappan), the Siswal wares, and the Atranjikhera OCP. There is a further concentration of Siswal sites in lower Haryana neighboring the central *Doab*. The discovery of what Suraj Bhan has termed "Degenerate Siswal Wares" (DSW) (1975: 113) sites in southeastern Haryana can thus be interpreted as bridging the chronological and geographical gap once thought to separate the OCP from the Siswal complex (Suraj Bhan 1975: 113). But, one of the points to have emerged from the Srinagar conference is that the OCP/Late Harappan material is still a terminological and conceptual morass deserving of an airing in a separate meeting.

Such a conference might be used in part to test the veracity of several points which seem to apply to the Eastern Domain:

1) OCP is a ceramic whose physical properties are a product of waterlogging.

2) There are several varieties of OCP. Each variety has its own temporal and spatial distribution. At least one of these varieties of OCP is contemporary with the Urban Phase of the Harappan Civilization.

3) There is a continuity between what can be termed the Chalcolithic tradition of the Eastern Domain and later PGW/NBP occupations.

CONCLUSION

It is not unreasonable to propose that until issues such as those noted above are settled, and archaeologists reach some common ground on terminology, little progress will be made on understanding more fully the later phase of the Harappan tradition, in the east or elsewhere. The tools to accomplish this task are available today and they need only be applied to the materials in hand and still buried in ancient settlements. International cooperation is one way for problems such as this, and others mentioned earlier in this essay, to be addressed, since it would naturally bring to bear a variety of perspectives. Conferences such as that held in Srinagar might someday be seen as the beginning of such integrated archaeological research strategies.

NOTES

[1] This may be just the kind of generalization that J. Shaffer is cautioning against in his contribution to this volume.

[2] J. Shaffer (in press: 77) states: "There is no conclusive archaeological evidence to indicate that large 'urban' settlements disappear" during the Post-Urban Phase. This is a difficult statement to deal with because of the assumption implying a unique correlation between settlement size and a notion of "urbanization." Clearly large sites could be present in this area during the Post-Urban Phase but with a population that was organized along non-urban parameters. It is also conceivable that a sociocultural system of an urban type could be present at small sites during this time period. If the latter is the case, I would have to revise my (1977) terminology; something I am presently unwilling to do. Shaffer is correct in noting that there could be large sites in this area during the second half of the second millennium—say after 1800 B.C. But, it is a moot point since many, if not most, of the sites one would look to in this regard have many thousands of cubic meters of overburden covering the Harappan occupation. Determining the limits of these occupations may take many years, if not many lifetimes. Moreover site size might not be as important an indicator of urbanization as is frequently

believed. Other features, lying closer to the core of an urban form of sociocultural organization, are involved, as well, and may vary independently from settlement area, or population. Here one is talking about social classes, a state, craft and career specialization and the like. It is widely known that these parameters have been difficult to measure in the Harappan case. However, there are some features which seem to stand for them; writing, signs of long distance trade, unified systems of weights and measures, and evidence for occupational specialization. Therefore it is important to follow these "proxies" in peripheral regions such as the one under discussion since they seem to disappear, or be severely attenuated in evidence following the second millennium transformation of Harappan Culture. That is, while there may, or may not, have been large settlements in this region during the Post-Urban Phase one has a fairly good notion that the system of Harappan writing disappeared along with the weights and measures, and other proxied urban features. Thus, one is dealing with a non-urban form of organization for the "Late Harappan" sites in this area.

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PART I

THE NATURE OF HARAPPAN URBANIZATION

VISHNU-MITTRE

1. The Harappan Civilization and the Need for a New Approach

INTRODUCTION

KNOWLEDGE of the Harappan Civilization has advanced considerably since Charles Masson first reported the vast mounds of Harappa in 1826. A valuable mass of information relating to town planning and architecture, arts and crafts and the way of life of the Harappans emerged between 1924 and 1929 (Marshall 1931) from the description of artifacts and from inferences drawn therefrom. The subsequent excavators followed almost the same trends in thought concerning inferential aspects of the artifacts (Vats 1940; Mackay 1943). A school of thought had been founded, and it greatly influenced later excavators. Overwhelmed with the similarities throughout the Harappan area, this school of thought always placed more emphasis upon features of uniformity than upon the contrasting ones. This civilization was believed to be exotic and strictly urban. The vast expansion, material advancement and economic prosperity of the Harappans was attributed to a wet climate, the drying up of which was believed to have caused its decline.

These thoughts have reigned supreme in the minds of many archaeologists in spite of excavations at several more sites which have demonstrated meaningful variability within the culture. The discovery of non-urban sites, the recognition of indigenous features in this civilization (Sankalia 1974) and the strong disputation of the earlier concept of a wet climate (Raikes 1964), etc., gave birth to a new school of thought. These two schools have grown and become rigid in the course of time.

New disciplines such as Palynology, Paleobotany and ^{14}C dating were harnessed to throw fresh light on the origin, spread and decline of the Harappans, the climatic background of the civilization, the food habits of the people, chronology, art and architecture. But lamentably, in spite of providing a decisively fresh perspective, the trend has been to follow the beaten track opened by either of the two schools of thought. The gulf between these two schools has widened even though frequent seminars exclusively devoted to this culture have been held. The most recent was in 1978 in Karachi.

Divergence of opinion may be a sign of progress, but rigidity is certainly not. Why cannot the specialists and protagonists of these schools sit together and sort out their differences by identifying areas into which intensive research can be directed with a view to bridging the gap? There is now an immense stock of data and it is time for a healthy "taking of stock." This can bring a reorientation of thought and fresh approaches which will solve the problems that have been neglected so far. This small communication by a non-archaeologist is an attempt to draw the attention of experts to certain fresh approaches, which I believe, may answer several of the questions concerning the life and culture of the Harappans.

The Harappan Culture flourished in a vast tract of the land which today ranges from coastal to continental plains and uplands extending into the sub-Himalayan region. Within this area today there are patches of dry deciduous forest, desert communities and salt marsh vegetation. The rainfall pattern is much varied from isohyets of 10 to 60 centimeters.

The isotherms are similar. The region also varies physiographically. Did a similar varying pattern exist during the Harappan times, or was it much different from today? This has been a matter of serious enquiry since the first site was excavated. There is an answer to the question, but it is concealed by a vast and inscrutable body of data. Long strides will be made in the understanding of the Harappans if a systematic approach is taken in this area of research.

LOCAL AND REGIONAL VARIABILITY

The contemporary local and regional variability in the Harappan Culture has been a neglected field. Owing largely to this neglect it has not been possible to reconstruct the rate and direction of the Harappan development and its geographical expanse. As a result, causes for the extinction or diffusion of the Harappan Culture have eluded the experts. Finally, the complexity of the Harappan environment has never been considered since one has been generally concerned only with wet or dry climate.

The uniformity of weights and measures, and the common features in architecture, town planning, art, religion, script and seals, etc., have become such an obsession that archaeologists have lost sight of features which perhaps distinguished local settlements from one another and from those distantly located.

The qualitative and quantitative assessment of material data between the metropolitan towns or cities and the smaller settlements, the life patterns of the inhabitants and the environment and socio-economy are certain to provide valuable information. It is these areas in which new research is needed since only this will solve the profound and tantalizing problems of the way in which this culture developed, how it was maintained and the manner it declined or was "diffused" into subsequent cultures. The role of the large settlement sites vis-a-vis town/city or village places and trading and cultural contacts are other important features on which light can be thrown. Even with "competent dullness" which was "technically the peer of the rest," meaningful local and regional variation must have occurred. The gradual and successive development of the Harappan Culture from the Pre-Harappans, the retention and subsequent modification of Pre-Harappan traits and the ultimate abandonment of the nonadaptable features which led to the emergence of an exclusively Harappan Culture can be revealed through qualitative and quantitative analysis. Some of the Harappan traditions were first established by the Pre-Harappans at certain sites. The presence of great walls around Pre-Harappan settlements as at Kot Diji and Kalibangan and their use of dried bricks of a standard size (3:2:1) are interesting; though some features were modified later by the Harappans (Allchin and Allchin 1968). The extent to which these aspects were restricted to few sites, and if so, what the level of development was, should be a matter of enquiry.

Precise knowledge of the alignment in the layout of the streets at Mohenjodaro is particularly lacking. The layout of the settlement was in some respects different at Lothal. The use of baked and sun-dried bricks varies between Harappa, Mohenjodaro and Kalibangan. At Kalibangan baked bricks were reserved for wells, drains and bathrooms; at Mohenjodaro sun-dried bricks were used for filling and at Harappa they alternated with burnt bricks course by course. Further, the buildings of the citadel mounds, or their vicinity, show considerable variation (Allchin and Allchin 1968).

The plant economy of the Harappans finds considerable geographical differences: wheat and barley at Mohenjodaro, Chanhudaro and Harappa; only barley at Kalibangan; rice and millets at Lothal, Rangpur and Surkotada, and at the latter site particularly, there were enormous quantities of seeds of wild plants, grasses, sedges and other weeds (Vishnu-Mittre and Savithri 1978: 67).

There may be other local and regional variable features, and these could be highly meaningful.

THE RATE AND DIRECTION OF ADVANCEMENT

The Harappan Culture, whether indigenous or not, must have commenced at one center wherefrom its spread was gradual, radiating subsequently in various directions, the Harappans eventually colonized a vast area. In the virgin areas it reached, it met with environmental features different from those in the source area. The colonization in a virgin area was thus conditioned by local environment factors, the adaptability to which must be read in the variability of settlement and variable patterns of life style, art and architecture, food habits and pottery. It is essential to establish this fact so that the directions of advancement of this culture can be mapped. One can no longer get away with the concept that "the Harappan

Culture appeared with a bang."

The rate of advancement can best be reconstructed from radiocarbon dates. There are in all over 70 radiocarbon dates available for the Harappan Culture. Slightly over 17 sites have been dated, some of them copiously. Kalibangan, for instance, has 30 dates and others have one to seven; however most sites have not been copiously dated (Sankalia 1974).

The present ^{14}C dates suggest that the Pre-Harappans lived together with the Harappans for a fairly long time at Kalibangan. At Bara and Mitathal the culture preceding the Harappans also continued after them. Did the Kalibangan Pre-Harappans come from Kot Diji or Bara and Mitathal? Wherever they came from one ought to know the amount of time they took to reach and settle at Kalibangan.

Likewise, the Harappans at Mohenjodaro and Lothal were contemporaries; whereas those at Kalibangan and Damb Sadaat II preceded them by about 200 years. And at Surkotada they were later than Lothal.

The close of the Harappan Phase has been estimated to have been around 1700 B.C. with the exception of Banawali. There it was 1300–1400 B.C. With extrapolation, however, it has been estimated that 2300–2000 B.C. was the span of time in the nuclear regions and 2000 B.C. to 1650 or 1700 B.C. for the peripheral regions. A major question that confronts one here is: Has the last word been said on the span of the Harappans?

Within the picture that has emerged from ^{14}C dates, indications are apparent that the determination of cultural variability, accompanied by a series of radiocarbon dates from freshly dug sites can help measure the rate of development of the Harappan Culture and map the directions of its advancement. The continuation of Pre-Harappans into the Harappan Culture followed by the Post-Harappan at Amri of Chanhudaro and the overlap between the Pre-Harappans and Harappans at certain sites (e.g., Kalibangan) strongly suggest that the Harappan Culture did not appear with a bang. Rather, it evolved gradually from the pre-existing Pre-Harappan Culture. Considerable variability seems to have been involved here. Some sites have only the Pre-Harappan Culture. Other places show it developing into the Harappan Culture. Some sites have Harappan Culture only, and some have the late phases of the Harappans followed by subsequent cultures. The abrupt appearance of Harappans at a particular site may be due to the colonization of that site by a culture at a particular stage of development. Likewise, the disappearance of a cultural complex may involve the movement of its people. An overview of the entire picture suggests that neither the development nor the decline from one phase to another was simultaneous. Local and regional factors determined that the colonization of a site would take place at a certain phase of the Harappan development and its arrest or further development thereafter was similarly determined. It is high time that the dates are reinvestigated with freshly reoriented attitudes. No longer can one be obsessed with the idea of an abrupt end to the Harappan Culture. The data show that at Amri the Mature Harappan is succeeded by the Jhukar and Jhangar Cultures respectively. The picture is the same at Chanhudaro. Likewise there is evidence of the continuation or survival of this culture at Rangpur, where the Post-Harappan Period is marked by new pottery styles. The interval between these phases is marked by floods which perhaps forced the Harappans to abandon their site (Sankalia 1974).

At Somnath, the settlement on a thick flood deposit starts ca. 2000–1800 B.C. The culture has similarities to the Late Harappan and continues with the Prabhas Ware until 1500 B.C., when the pot shapes are copied from the Harappan Ware. The occupation continues until the first century B.C. (Sankalia 1974).

These instances once again show that the Harappan decline was neither a uniform nor a simultaneous event. Further, the culture diffused into succeeding cultures in which should be included the Cemetery H, Ochre Colored Pottery (OCP), the Copper Hoards and Painted Gray Ware (PGW). The diffusion was also partial, as stray Harappan finds have been discovered. The qualitative and quantitative analyses of material will help in determining the directions taken by the Harappan Culture.

THE ENVIRONMENT OF THE HARAPPANS

The rigidity of the two schools of thought referred to earlier has centered around the issue of a purely wet or dry climate during the Harappan times: wet during the Mature Harappan Period and dry during the period of degeneration. The debate over the years has offered strong, though refutable, arguments for and against each position. The hard fact that cannot be denied is that the Harappan stage was in many ways very different, particularly in geographical expansion, art, architecture, etc., from its antecedents and the Post-Harappan Cultures. This would not have been possible without a favourable environment, which according to one school, is believed to have been appreciably wet. The word humidity is also used to express wetness. Estimates for the amount of precipitation are often given but not for humidity. And the relation between the two is not realised at all. For instance, Delhi with 667 millimeters of total precipitation has a 48 means average humidity, and Shri Ganganagar in West Rajasthan with 218 millimeters of precipitation has a 47 mean average humidity. Bikaner and Jodhpur have the same humidity of 41 whereas rainfall is 291, and 361 millimeters respectively. Dwarka in Gujarat has 73 humidity with 354 millimeters of rainfall. Etawah in Uttar Pradesh has 77 humidity with 758 millimeters of rainfall. But, all these areas are characterized by the Northern Tropical Thorn Forest and are semiarid to arid.

In my opinion enough has been said about climate. A climate of division has been created and the two schools have almost reached a point of no return. Obsessed to the extreme with climate, the search for the environment of the Harappans has been overlooked: climate is indeed a part of environment but it includes many other things as well. It is a complex whole of many interesting factors which influence every organism. All that surrounds and affects an organism is its environment. There are biotic (inter- and intraspecific competition) and abiotic (soil, atmosphere, light, temperature, precipitation, etc.) components of the environment.

As part of the biotic component, especially for man, the psychology, level of tolerance and adjustability play an important role apart from competition.

Man inhabits regions with or without a congenial environment. People living in both hot and cold deserts and arctic alpine regions show the extent of their tolerance and adjustment to a harsh and most inhospitable climate. The Indian desert is not as bad as elsewhere, since in the extreme it still has a rainfall of 10–25 centimeters. Between 17 and four persons per square kilometer inhabit the region and in several cases they have to fetch water for their daily needs from a distance of several kilometers. They have adjusted to nature. In the sandy region of northern Gujarat, the banks of the rivers and streams are complicated by a network of small rivulets and *nallas* which extend with each monsoon. The villages along their banks are constantly forced to move further inland. They do this but still do not permanently abandon the region.

Artemisia plants are known to possess alkaloids which repel sheep and goat and in normal circumstances these plants are left untouched. But in the harsh climate of Ladakh, *Artemisias* are not spared because of the paucity of other edible herbs (Duthie 1893).

The district of Kutch, with widespread saline marshes, the Little and the Great Ranns, where several Harappan settlement sites have been discovered, has a population of over 850,000 with 16 persons per square kilometer. A large part of its area (44,136 square kilometers) is a wasteland even though 5,149,000 hectares are under cultivation in millet, cotton, pulses and groundnut, etc. (Gaussen *et al.* 1968). And there are nearly 50 important towns and quite a large number of villages.

Several more instances of this kind may be cited of biotic and human tolerance and adjustment to the adverse vagaries of environment.

Water is the first essential for any biotic element and that explains human settlements along rivers, streams, or their tributaries. It is this riverine environment to which man owes the progress and decline of his civilizations. However harsh and inhospitable the climate may be, it is compensated for by the presence of water in the riverine environment. Wells may also be dug to further ameliorate the situation. Natural phenomena causing shifts in the river courses or their drying up have been the chief cause for the weathering out of a civilization. No matter how dry the climate may be it does not necessarily cause a river or stream to dry up. Any change in the source can be responsible for this. There is thus a need to study the impact of earth movements which result in changes in river courses or their sources. The lack of a continuous water supply may let loose the degeneration of a flourishing culture and reduce it eventually to nomadism.

Human influence in changing riverine environments to man's detriment may have far-reaching consequences. Hystera village in Chomu Tehsil of Jaipur District, about 45 kilometers northwest of Jaipur on the left bank of River Manda, is a typical example. Records reveal that nearly 300 years ago Hystera was a populous (7000 agricultural families) and prosperous village, famous for calico printing. Now there are only 1800 families. In addition to the written records there are the ruins of a fort, buildings, mosques, and the dry river, all of which speak of the village's former prosperity. This debacle resulted from bad management on the part of the villagers. Their ruthless cutting of vegetation caused soil erosion, resulting in the renewed activity of sand dunes and their encroachment on the productive lands. This turned their prosperous village of 300 years ago into a deserted one (Sankhala 1964).

Another interesting case of human interference can be cited in the territory between Lakhpat, Sahara and Mundan in Kutch, extending to a few miles north of Sindri which is now desert. Prior to A.D. 1800 it was a fertile tract and grew rice which yielded good revenue. Further, the channel from Lakhpat to Alibandar was navigable in A.D. 1808. The channel, called Puran, was once a considerable and perennial river across the western Rann to the sea via Lakhpat and Kori creek. At an earlier date, shortly after 1762, the ruler of Sind constructed a bund or barrage at Mora to divert the river into his territory. This resulted in salinity and the desertification of this territory in Kutch (Raverty 1892–97; Oldham 1926). Rice has not been cultivated there since then.

History is witness to the greater prosperity during the 16th and 17th centuries in Agra, then North India's largest commercial center, Cambay and several towns in the Rajasthan desert and Sind have lost much of their prosperity at the hands of man himself—his neglect and interference. Today, only ruins stand as a testimony supported by historical records to flourishing trade and commerce in these places.

The area of Okhamandel in Jamnagar District was once densely forested and fruits of *Tamarindus indicus* were exported from there. It was destroyed by Mohammad of Gazni in the 11th century A.D. Now tamarind fruits are not even available for domestic use here (Gaussen *et al.* 1968: 29–30).

Indigo and *Lathyrus odoratus,* both legumes, the root nodules of which help in the natural fertilization of soil, were once widely cultivated in the western region of the Subcontinent. Their cultivation was stopped by the British and this adversely affected soil fertility.

The gigantic ruins of Mundore Fort and several others, approximately seven kilometers in circuit, and castles and estates in the heart of the desert in Pokurna, Jodhpur, Jaisalmer and Saurashtra are testimony to flourishing prosperity in recent history (Todd 1829: 559–67).

Are these events due to human interference and the mismanagement of natural resources, or have there been changes in precipitation and temperature in the centuries preceding the present? No records of such changes in climate are available. The situation has been aggravated by the frequency of famines, one almost every seventh year.

These examples emphasize the need to reexamine in a new way the causes of the degeneration of the Harappan Culture. It may have been their overuse and mismanagement of natural resources, interference with natural phenomena accompanied by earth movements, which may have proved detrimental to their flourishing civilization, eventually settling in nomadism during the Late Phase. Thus, at some sites the degeneration appears to continue and develop into different cultures. But they still retain the Harappan imprint. Other groups moved out, radiated into different directions and mingled with other cultures imparting to them some Harappan impact.

The present, indeed, is the key to the past. But, the immediate present has witnessed changes due to factors which were perhaps not operative during the Harappan times. So the comparison is not fair and could be misleading. There has to be a base period for comparison, just as 1950 is the base year for ^{14}C dates. The 15th to 18th centuries can be considered suitable for the purpose.

Whatever be the base year, the fact that should not be overlooked is that there have been climatic and environmental fluctuations during even the last few centuries. Their impact on plant, animal and human communities, as well as their distribution, have not been properly assessed for comparative purposes with times several millennia ago.

Precipitation is very erratic in the arid region of Rajasthan. From 1875–1960 there have been eight years with a precipitation deficit of 50–83 percent of the norm. There were also nearly eight years when rainfall was 50 to 120 percent in excess of the norm (Datta and George 1964). From 1891 to 1960 Bhuj and Jodhpur experienced six to seven shifts to a semiarid climate. At each place there was a change to a dry subhumid climate: in 1917 at Jodhpur and in 1926 at Bhuj (Subramaniam 1964). A general trend to more congenial climate was observed from 1941–50; whereas the decades between 1911 and 1921, 1931 and 1940 were characterized by severe aridity. The year 1899 saw a famine in Rajasthan; 1899-1900 at

Ajmer (Subramaniam 1964).

The recent analysis of trends in climatic change in Rajasthan during 1891–1975 (Krishnan 1977) reveals that:

1) The below-normal rainfall spell from 1962–71 is comparable to a very significant below-normal rainfall spell from 1895–1905. The overall pattern shows a decrease from 1956 to 1969 and an increase thereafter. But at Churu, and to some extent at Jhunjhunu, just the reverse happened: increasing trend during 1957 to 1963 and a decreasing trend thereafter.

2) The period 1970–80 has been one with excessive rainfall (in 1970, 1973, 1975, 1976, etc.). During the surplus rainfall year of 1944 Barmer and Jaisalmer came under the subhumid category; but Bikaner, Phalodi and Ganganagar continued to be in the arid zone. During the high deficit rainfall of 1941, arid zone conditions prevailed in the entire state except in the Banswara and Jhalawar regions.

3) During 1901–70 the aridity index line of 80 shifted to the east in the first and second decades, particularly in Ganganagar, Bikaner, Churu and Jodhpur Districts; but no change was noticed in Barmer and Jalore Districts. Different decades from 1920 to 1970 witnessed minor oscillations comparatively more marked in the north (Churu District) and in the south (Jalore District).

A decreasing trend in summer temperature, and an increasing trend in winter temperature, was observed from 1960–61 in Jodhpur. There was a steep fall in wind speed from 1941–47 and gradual increase thereafter followed by a decline from 1952–1975.

The availability of surplus water in Jodhpur for runoff and the recharge of aquifers was steady during the period 1901–40; maximum during 1941–50; and decreased thereafter. The smallest figure (81 millimeters) was recorded during 1961–70. The pattern is consistent with the pattern of decreasing rainfall during this decade. Decade by decade surplus water for runoff and the recharge of aquifers is shown in Table 1.1.

It would also be of interest to know of instances of seismic activity. The year 1899 had the worst earthquake in Gujarat and Kutch (Oldham 1926). This may have caused river discharge fluctuations, changes in lake levels, changes in rainfall and temperature. Some of these may be local but others are regional in character. Unfortunately data are not available.

Many of these changes last over a decade or so. Some are also believed to be related to sunspot activity (Jagannathan and Raghavendra 1964). Short-term fluctuations have a direct economic significance, particularly in regard to crop yields, which may vary. Long and severe fluctuations may have a substantial influence on the life and distribution of plants and animals. But this can only happen if the duration and degree go beyond the threshold of biota tolerance.

Table 1.1

	1901-10	1911-20	1921-30	1931-40	1941-50	1951-60	1961-70
Number of surplus years	2	3	4	3	4	2	3
Total surplus water in millimeters	376	365	341	326	555	143	81

(Krishnan 1977: Table 4).

It is reasonable to believe that short-term environmental changes, as observed during the last few hundred years, also occurred in the past, together with man's mismanagement of natural resources. The total, cumulated impact of all these should be considered the chief cause for the rise and fall of civilizations. Other factors such as war, may also be considered. But one does not have sufficient means to reconstruct short-term environmental alterations at archaeological sites. No matter how closely spaced a pollen sample may be it can represent several decades, and the reconstruction of decade to decade environmental changes is not possible with this tool. Can it be done through the study of stratigraphy and nature of sediments exposed in trenches at archaeological sites?

The estimated time span for the Harappans in the nuclear and the peripheral regions is each about 300 years. To believe that the environment remained static during those three centuries would be untenable in the light of present knowledge, as already stated. An individual site, or a group of sites, had its own environmental context, and it is this context that should be reconstructed and compared or contrasted with contexts elsewhere.

The desertion of the gigantic forts and castles in the heart of the Rajasthan desert and the construction of new ones not distant from the ruins, is indeed due to alterations in the environmental contexts rather than a change in climate.

The Harappans living at Lothal and Rangpur were recurringly affected by floods from 2450 B.C. to

1600 B.C. but they continued to struggle and reconstruct. At Surkotada, not very far from there, the Harappans never experienced such a calamity and the conflagration between Periods II and III did not result in degeneration but the adoption and enrichment of Harappan traits, the construction of massive ramparts and an increase in copper objects. Nothing of this kind happened at Kalibangan as the environmental contexts were different there. A much different environmental context governed the undisturbed continuation of the cultural complex of the Harappans along the three-hundred-mile strip of the Hakra between the fourth millennium and the first millennium B.C. (Mughal 1980).

The varying environmental contexts in different parts of the Harappan Empire governed cultural processes, some of which led to urbanization, social and economic stratification, intensification of specialized activities as well as the organized exploitation of natural resources. An overview of all the discoveries sees these cultural processes at different stages of development and decline. It is a cultural complex in the real sense of the word. Recognition of it in the Early, Middle and Late Harappan Phases has attained a rigidity of attitudes which have eclipsed the understanding of the real perspectives. With hardened attitudes over the years, as often happens, one has failed to make use of the facts available.

For instance, one has not realized from the *Rigveda* and the later Vedic texts, that the Aryans were the first observers of the Harappan sites: the ruined mounds and cities along the banks of the Sarasvati and Drishadvati Rivers. They even named them: Naitandava, Vyarna, etc. Their ruination was not caused by the Aryans and the statement in *Taittiriya Brahman* (II, 4, 6, 8) is just a casual one that "The people who lived here were expelled by you, Oh Agni, and have migrated to other lands." The Aryans did encounter the dark-skinned, snub-nosed worshippers of Sisna deva who were rich in cattle and lived in Puras. Through battle and fire the Aryans did destroy their cities, Narmini for instance. They saw the local inhabitants flee rather than fight them. What about the chronology of the Aryans and what about the cultural complex they encountered and fought and destroyed? Knowing nothing of that, one makes much out of the slender evidence from the Harappan sites. Is one really justified in stretching the evidence that far?

The origin of lakes in the northern part of the Rajasthan desert about 10,000 years ago is believed to have been due to a prevailing wet climate at that time. The factual support for this belief is derived from meager stratigraphic and palynological evidence (Singh *et al.* 1974). Sambhar Lake, from which the stratigraphic evidence is derived, is in fact, as the geographical survey of the region reveals, an abandoned meandering river channel. This was choked by invading sands, suggesting that the environment then governing the movement of dunes, must have been dry or arid, rather than wet. The subsequent proportional decrease of the meager fresh water pollen suggests the progressive increase in aridity, resulting in a proportional increase in the salinity of the lake. Further, the simultaneous increase in the pollen of herbs, shrubs and trees, and of exotic pollen transported from the Himalayas in the north and Mount Abu in the south, suggests a further increase in aridity, and an environment charged with high speed winds and dust storms during the time period corresponding to that of the Harappan Civilization (Vishnu-Mittre 1978).

The varied environmental contexts helped the evolution, and subsequently the devolution, of the Harappan cultural complex. During devolution, there set in the evolution of new cultural complexes following the alterations in the environmental context. One strong, and common, element of the environmental context was the riverine environment. This was altered with the change in river courses along the banks of which the Harappans had lived (Wilhemy 1969). Readjustments to the alterations in the other elements of the environment kept the wheel of cultural processes moving, sometimes fast, sometimes slow, but to and fro.

During the course of adjustment, old traits were modified or abandoned and new ones evolved. For instance, in the later Harappan tradition most metal tools, mother goddess figurines, standard cubical weights and square steatite seals disappeared and changes were brought about in pottery. The cultural processes continued into PGW times at Bhagwanpura and Dadheri. The discovery, and use of iron, necessitated the abandonment or modification of old traits, pottery and elements of art and architecture, suiting them to the new environmental contexts. A qualitative and quantitative approach to variability of traits is certain to bring forth much new information. Together with a fresh approach one must keep the environmental contexts in view, and abandon rigid and stereotyped attitudes.

CONCLUSION AND SUMMARY

This paper urges the examination of the immense data at hand with a reorientation of thought and a fresh approach. Radiocarbon dates, and the qualitative and quantitative assessment of contemporary local and regional variability against the shared features of the Harappan cultural complex from one site to another should be worked out to determine the rate of local and regional development of the culture and to reconstruct the directions of its geographical expanse. Work along these lines will, it is believed, go a long way in solving many baffling problems that have confronted one for years. These include the interrelationships between the Pre-Harappan and Mature Harappan and the diffusionary processes at work during the later phase of the Harappan Culture. The various excavated sites should be looked at as colonizations by the Harappans at a particular stage in the development of the cultural complex. This was governed by local and regional environmental contexts, which either allowed further development of the complex or arrested it.

It would be advisable to designate the Harappan Civilization a cultural complex rather than dividing it into three phases: Pre-Harappan, Mature Harappan and Late Harappan. The entire complex shows a development of traditions which were either retained and modified, or abandoned because of their non-utility, and replaced by new ones. The trend of development of traditions is progressive or retrogressive depending upon the environmental context and this is apparent in the various levels or stages of development observed at the sites excavated. They should be treated as parts of the entire cultural complex, and in their stages of development should be treated as features with trends towards urbanization in the background of the struggle against environmental contexts and their ultimate adjustment to it.

Viewed in this light it would appear that the various processes of evolution and devolution of the cultural complex can be reconstructed if the sites are not considered isolated, either locally or regionally. Evidence has come forth from the commencement of the Pre-Harappans from a preceding culture; of Pre-Harappans living together with the Harappans; and of Harappans passing through the Late Harappans into the PGW Culture. Conditioned as the evolution or devolution processes were by the environmental contexts, differing locally and regionally, the events of initial development, maturity and decline could not have been simultaneous in the entire Harappan Empire. This aspect can be more clearly brought out by the qualitative and quantitative assessment of the traits.

It is inadequate to use wet or dry climate to explain processes of evolution and devolution. It is more important to reconstruct the entire environmental context of each site, keeping in view the psychology, the level of tolerance and adjustability of man to the vagaries of environment. Man's interference with, his exploitation of natural resources and his mismanagement, are other features which should not be overlooked.

Short-term fluctuations in the environment during the past few centuries are very suggestive that the naive, rigid attitudes about wet and dry climate should be altered. These fluctuations have a duration of a decade or so. Their cumulating impact on contemporary societies must be borne in mind to interpret the data on the Harappan cultural complex. All means should be used to determine short-term fluctuations in the past. Indeed, a new approach is needed here.

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2. Harappan Culture: A Reconsideration

INTRODUCTION

FIFTY years ago, the discovery of ancient cultural remains at Harappa and Mohenjodaro thrust the Harappan Culture upon the archaeological world. Although scholars were aware of the antiquity of cultural development in the South Asian Subcontinent, few were adequately prepared to cope with the nature and scope of cultural phenomena revealed by these and subsequent excavations in the Indus Valley. At the time of the discovery of the Harappan Culture, many scholars felt that technological and social innovations which resulted in urban literate cultures occurred initially in Mesopotamia and then diffused to other areas of the Old World where indigenous populations adapted them to local conditions. Besides diffusion of technological and social innovations, the other explanation most used by archaeologists of an earlier period to account for culture change was a more abstract theory about universal, or unilineal, evolution, exemplified by the various writings of V. Gordon Childe. However, when dealing with the explanation of particular cultural sequences, most archaeologists used what has been called cyclic models of cultural development. This model is based on an analogy of the life cycle of living organisms (see Nisbet 1969 for discussion); that is, every culture undergoes a developmental sequence of origin (birth), fluorescence (maturity) and decline (death). All cultures were subject to this cycle of stages. Any similar traits exhibited by different cultures were taken to mean that similar cultural processes were responsible for them or that diffusion had taken place. Since Mesopotamia was viewed as exemplifying the innovations which result in the development of early urban civilization, the social record retrieved there through archaeology could be applied to any area which had urban centers—especially an area as geographically close as the Indus Valley. Metallurgy, urban centers and literacy were associated with extensive external trade, centralization of political and economic organization, and the development of hereditary elites in the Mesopotamia area, and archaeologists, until recently, have never questioned that the same traits are exemplified by the Harappan data.

The high level of technological sophistication, the well-organized appearance of the architectural units, and the striking similarity in objects of material culture between widely separated sites recorded for the Harappan Culture were traits which could be compared to the final phases of early urbanization and state development in Mesopotamia. It was noted, however, that these traits were much more pronounced in the Indus Valley than in Mesopotamia. In particular, the traits of stylistic similarity and well organized architectural layout of settlements in a culture which encompassed such a vast geographical distribution (far larger than anything in Mesopotamia) suggested to early investigators that here was an example of an early urban literate culture and one also demonstrating the presence of a rigidly stratified, centralized and authoritarian government. Early interpretations about an Harappan Empire, with twin city capitals and a uniform and conservative culture were first comprehensively discussed in Piggott's (1950) general synthesis on the archaeology of South Asia. In one form or another, these same interpretations about the nature of the Harappan Culture have been repeated in nearly every synthesis on the culture to date. The uncritical acceptance of these *interpreta-*

tions by South Asian archaeologists has resulted in preconceived notions about the nature of the archaeological data, which in turn has been used to substantiate the original interpretations. This unquestioning transference of interpretation to studies of Harappan Culture hampers attempts to let the Harappan data "speak" for itself. The purpose of this paper is to examine some of these preconceived notions about Harappan Culture in light of recent data and analysis.

THE CURRENT STATE OF INTERPRETATION

A review of protohistoric archaeological research in northern South Asia shows that the major point of interpretation of any site or cultural complex is how it relates to the Mature Harappan. The usual, and often the only, question asked of the data is whether it constitutes an example of Early, Mature or Late Harappan cultural development. Usually this question is addressed through trait analysis of material artifacts which are compared for similarities and differences to those recorded for the Mature Harappan. Once this relationship with the Mature Harappan is established, cultural data is analyzed either within the context of western diffusionary social influences or as the life cycle inherent in any given culture group—the group is born, lives and dies at some point in time. This approach has limited the interpretation of Harappan Culture and affected the perspective of what constitutes cultural development in the general South Asian context. Two schools of thought have developed: those which see the Mature Harappan as an intrusive cultural development versus those proposing an indigenous cultural development. Related to this issue is how to evaluate the three known cultural complexes which are stratigraphically and chronologically earlier than the Mature Harappan. Debate about the developmental role played by Amri, Kot Diji and Sothi cultural complexes in the formation of the Mature Harappan has pre-occupied South Asian archaeology for the last twenty years. Many (e.g., Wheeler 1968) deny that any genetic cultural linkage exists between these cultures and what has been called the Mature Harappan. Others (e.g., Mughal 1970) maintain that while singly none of these complexes is a direct ancestor to the Mature Harappan, if all three are combined into a single, albeit diverse, cultural complex, they do share enough characteristics with the Mature Harappan to be considered an early phase of the Harappan Culture. This debate is currently unresolved. The point being made is that an overriding concern of how these cultures fit into a cyclic model of development of the Mature Harappan restricts the types of data collected, limits analysis and curtails the focus of research.

Research related to these three cultural complexes has been stratigraphical, chronological and typological in nature. Stratigraphic and chronological data have been utilized to demonstrate the greater antiquity of Amri, Kot Diji and Sothi complexes with respect to the Mature Harappan. Developmental relationships between these complexes and the Mature Harappan have usually been based on typological studies of material culture. Such studies emphasize the similarities and differences which can be defined between the material culture of the Mature Harappan and the artifacts associated with Amri, Kot Diji and Sothi complexes. As a result, one has an idea of the relative and absolute chronology for these complexes, and an extensive knowledge of material culture similarities and differences which exist between them as a group and the Mature Harappan. However, one knows very little about the Amri, Kot Diji or Sothi economics, settlement patterns, or about the political, social or religious organizations. In other words, more is known about the similarities and differences between the Mature Harappan and these groups than is known about the total cultural configuration of any particular social unit or group as a whole. The present data base is so limited that even if a definite cultural-social link could be established between one, or all of these complexes, and the Mature Harappan, it would still not be possible to explain how the link is defined through time, i.e., what changes occurred to create the Mature Harappan Culture.

The focus on the link between the Amri, Kot Diji and Sothi culture complexes and the Mature Harappan has been at the expense of addressing critical issues of the early protohistoric period in South Asia. First, how can the presence of these cultures in the Indus Valley be accounted for? What is the nature of the social, political, religious and economic organization of these complexes? Do Amri, Kot Diji and Sothi represent distinct cultural entities or are they regional variants of a basic cultural pattern? Since these complexes maintained some degree of interaction among themselves (evidenced by intrusive/trade items as well as similarities among some objects of material culture), what was the nature of these interaction networks, and how were they maintained through time? The questions of regional diversity and maintenance of interaction networks are important to understand not only the nature of these cultural complexes, but also that of the Mature Harappan. One of the major characteristics of the Mature Harappan is the presumed establishment of homogenous cultural traits throughout the Indus Valley. Although the homogeneity of Mature Harappan material culture has been overstated, its continuity in material culture style and types contrasts to the more obvious regional diversity of the Amri, Kot Diji and Sothi complexes. It is possible that the homogeneity of Mature Harappan material culture reflects, or was a capitalization of, the interaction networks established by the Amri, Kot Diji and Sothi complexes.

Using cyclic models of development for interpreting Harappan Culture has resulted in the uncritical application of theories and concepts concerned with the development of urban literate civilizations in Mesopotamia (and other areas) to the South Asian context. As a result data on Harappan Culture has been forced into a framework supporting preconceived theories about early urban civilizations. The highly subjective interpretations of Piggott's (1950) general synthesis of the Harappan Culture are perpetuated to the extent that no other interpretation is considered possible, let alone valid. The central issue here is whether Mature Harappan traits such as the homogenous material culture, developed craft specialities (metallurgy, lapidary work, pottery, etc.), specialized public architecture (defensive walls, granaries, great bath, etc.), literacy, extensive external trade, and a grid-patterned urban center reflect a highly stratified society with centralized authority. In Mesopotamia similar culture traits are associated with the development of social-political elites, centralization of authority (sacred and/or secular), and the rise of early states which individually underwent cyclic patterns of development. A similar situation has been assumed for the Indus Valley. Recent excavations and reinterpretations of existing data on the Mature Harappan clearly indicate that the Mesopotamian models, even when adjusted for local factors, are not applicable to the South Asian context. The application of such models rests on a conceptualization of the nature of the Mature Harappan Culture unsupported by the data. I now want to consider the nature of Harappan Culture as indicated by the available data.

Data are limited in the sense that most interpretations are based on the excavations at Mohenjodaro and Harappa. Subsequent comparable excavations have been attempted at Lothal and Kalibangan, but definitive reports on these sites are not yet published. Perhaps no other "early civilization" has been so *thoroughly* reconstructed on the basis of two site reports as the Mature Harappan. With the known number of Mature Harappan sites approaching 200, the weakness of relying mainly on data from Mohenjodaro and Harappa becomes more apparent. Also, interpretation of the Mature Harappan has been significantly biased by the nearly exclusive attention given by excavators to the large, presumable urban, sites of this culture. As Fairservis (1975: 241-42) has noted, knowledge about Mature Harappan urban centers has been collected at the expense of knowledge about the equally important rural aspects of this culture. Another important factor overlooked in most evaluations of the Mature Harappan is that the site of Mohenjodaro, because of its large size (almost five times larger than Harappa) and several unique features (i.e., the great bath, granary style, etc.), may not even be representative of Mature Harappan urban sites. Failure to recognize these biases in the data results in uncritical distortions and interpretations about Mature Harappan Culture.

Some material artifacts of the Harappan Culture can be considered. Architecture, although technically an aspect of material culture will be discussed separately. The main analytical framework for Mature Harappan material culture was established by Piggott (1950: 135-42), who chose to emphasize the uniformity in style and technology definable among such objects as ceramics, metal tools, seals and weights. According to Piggott such uniformity correlates with a "... a monotonous regularity of a highly-organized community under some strong system of centralized government, controlling production and distribution and no doubt levying a system of tolls and customs throughout the territory under its rule" (1950: 136). Piggott felt that this uniformity reflected a basically conservative attitude toward culture change, one reflected in the Mature Harappan Culture to such a degree that he felt it had entered a stage of cultural stagnation. This interpretation of Mature Harappan material culture is somewhat reflected in all subsequent summaries on the culture. Of course, there exists a definite Harappan style and regularity in the types of objects associated with Mature Harappan settlements. However, it is possible that the uniformity of such objects has been overemphasized, and similarities which exist do not necessarily reflect a conservative cultural framework nor are they necessarily indicative of centralized types of political organization. Explorations and excavations in the eastern Mature Harappan sites have demonstrated that among the ceramics, some degree of regional variation does exist. At Surkotada (Joshi 1972) for example, Mature Harappan decorated pottery was found in association with a distinct regional style of ceramics. It is possible that the traditional emphasis upon the very distinctive Harappan black-on-red pottery has prevented the definition of regional ceramic variations which manifest themselves among the non-decorative or non-black-on-red ceramics. At the Mature Harappan site of Allahdino (a small site near Karachi) the distinctive Harappan black-on-red ceramic type was restricted to specific vessel shapes and sizes, and quantitatively constituted less than one percent of the pottery found. It is possible that the cultural rules governing the manufacture and distribution of the distinctive black-on-red decorated pottery were significantly different, and varied independently, from those which governed other types of pottery.

The current evidence indicates that regional variations can be defined among Mature Harappan ceramics. However, a similar situation does not seem to apply to other material culture objects such as metal tools, lithics, figurines, seals, weights and beads. Whenever these objects are found in a Mature Harappan context, they do reflect a pronounced degree of homogeneity in style and technique of manufacture. In assessing the importance of this homogeneity, the recent reanalysis of material from Mohenjodaro and Harappa by Fentress (1976) is worth noting. Fentress (1976: 205-63) was able to determine differences between sites based upon the proportional ratios of some artifact types when compared to an expected ratio based on the volume of excavated earth, 2 : 1 (Mohenjodaro : Harappa). Among the intaglio stamp seals, a between-site comparative ratio of 3 : 1 exists while the seal impressions had a reverse ratio of 1 : 3. In addition, a wider range of variation in seal type and symbols exist for Harappa when compared with Mohenjodaro. Anthropomorphic ceramic figurines were found to correspond closely to the expected between-site ratio of 2 : 1 but zoomorphic figurines were present in a ratio of almost 1 : 1. Male figurines had a higher frequency at Harappa than Mohenjodaro. In general Fentress maintains that figurines found at Mohenjodaro were also more elaborate than those at Harappa. Only stone weights were found to occur in the expected between-site ratio of 2 : 1. However, of the five metal categories examined (jewelry, tools, figurines, tablets, and vessels) none conforms to the expected between-site ratio. Ratios for these metal categories ranged from 4 : 1 to 33 : 1 with Harappa having proportionately less metal. Fentress also indicates that "Within the sites the DK Area of Mohenjodaro showed a high concentration of metal, while the high mound at Mohenjodaro showed very little compared to the high mound at Harappa" (1976: 260). There were certain tool and metal types that were mutually exclusive between the two sites. Finally, metal vessels were numerous, but vessel forms were distinct between the sites. Although Fentress' study has methodological limitations, it demonstrates that the importance attached to stylistic and technological similarities of the Mature Harappan hinders recognition of the frequency differences of various artifacts which exist at the two sites and hinders recognition of frequency differences which may exist between Mohenjodaro, Harappa and other Harappan sites. Such artifact frequency differences may reflect regional variations in man-to-land relationships, or functional differences among sites. It is increasingly apparent that characterizing Mature Harappan material culture as "monotonously uniform" is misleading and an oversimplification of the archaeological record.

Although regional variation exists for some artifact categories, a pronounced stylistic and technological similarity is definable in other material culture categories. Assessing the similarity is complicated by the fact that the geographical distribution of the Mature Harappan encompasses an area larger than any comparable or contemporary early civilization in the Old World. Such widespread cultural similarity has been attributed to the existence of a strong centralized government enforcing rules governing production, and to the innate conservate perspective of the culture (i.e., Piggott 1950). The absence of corroborating archaeological data indicates that alternative explanations may be possible. Specifically, it is suggested here that this similarity in style and manufacture among objects of Mature Harappan material culture reflects the existence of an extensive and intensive *internal* distribution and communication system (Shaffer in press). The quantity and variety of objects involved encompassing such a vast geographic area clearly suggests that regular avenues of communication and interaction were maintained among settlements of Mature Harappan affiliation. The fact that objects manufactured from materials with limited sources of origin (semiprecious stones, metals, etc.) were involved with this interaction system suggests that the broad-based Harappan Culture may have rested on an *internal* trading network. The extent of such an internal network is indicated by the variety and quantity of similar objects found throughout the vast geographical region occupied by the Mature Harappan settlements. The intensity or importance of such a system is only beginning to be appreciated. While it is expected that such large urban centers as Mohenjodaro, Harappa and Kalibangan would be involved in such an internal network, the excavation at Allahdino demonstrated that even the very small, presumably rural, types of settlements were equally integrated in such a network. Excavations at Allahdino demonstrated the presence of almost every major artifact category of the Mature Harappan Culture, including quantities of metal objects (including silver and gold) and semiprecious stones. At the same time, despite extensive excavations at the site, there is no evidence to indicate that any of these objects, including ceramics, were manufactured at the site. The present evidence suggests that almost all major categories of material culture objects at Allahdino were manufactured elsewhere, and came to the site via its residents who were participants in an internal Harappan trading network(s). The fact that the system involved the distribution of objects commonly used in daily activities, such as pottery, as well as objects of more limited function (jewelry), indicates that this internal distribution system was crucial to every phase of Harappan adaptation, whether urban or rural. The existence of such an internal artifact distribution network would account for the similarity found in Mature Harappan material culture and explain the development of the regional diversity noted above.

A similar problem exists when interpreting data dealing with Harappan architectural features. For example, the idea that only centralized social authority permits organizing personnel and material to build those kinds of structures is reflected in a recent summary of the Harappa Culture:

> The archaeological evidence does support a view of an authoritarian, hierarchical, social and political system: the extraordinary cultural unity maintained over that vast geographical expanse could not have been possible without a high degree of centralized authority. The large granaries, efficient drainage system, and planned settlements required central control (Lamberg-Karlovsky and Sabloff 1979: 203).

To be precise, the data indicates that "granaries" have actually only been identified at Mohenjodaro and Harappa (at Lothal this issue was avoided by designating one structure as a "warehouse"). Other than interpreting them as granaries, the two structures have little in common (Fentress 1976: 133-83 for extensive discussion of various traits). Architecturally there is no similarity between the two buildings so designated. At Mohenjodaro the granary is a rectangular series of mud-brick platforms separated by narrow corridors, while the Harappa structure is two long blocks of subdivided rectangular units separated by a central aisle. If uniformity in material culture was an important Mature Harappan trait then it certainly is not reflected in the construction of what are presumably two important public architectural units! The artifacts associated with these units "...indicate no particular special function either in the form of grains, storage jars or otherwise" (Fentress 1976: 179). Structures associated with the so-called "granaries" at these sites are completely different in nature. At Mohenjodaro the granary is found on the high mound in the context of other public units, while at Harappa the granary is found on the low mound surrounded by ordinary domestic structures. The Mohenjodaro unit would have needed an elaborate wooden superstructure for which there is currently no archaeological evidence. The so-called "loading dock" at the Mohenjodaro structure faces a narrow congested street, making it very unlikely that it could have so functioned as a grain transfer or distribution area (see also Jansen 1979 for discussion on this point). In summary there is nothing in the existing archaeological record to indicate that either structure definitely functioned as a granary, nor that of themselves they reflect a strongly centralized government or a redistributive economy. Yet there is no doubt that these are important architectural units and understanding what they represent is crucial to one's perspective on the nature of the Mature Harappan Culture.

In other architectural features, the Mature Harappan "gridiron layout" (Wheeler 1966: 23) of urban centers is said to reflect the existence of centralized authority and a highly developed sense of town-planning. Jansen's (1979) restudy of the Mohenjodaro excavations demonstrates that the gridiron layout existed more in Wheeler's mind than in Mohenjodaro's actual design.

> One recognizes that there is no actual proof for the famous 'grid pattern'. Only the north-south axis of First Street is evident. The second axis to the east is not proved. All other streets turn corners and do not fit into a 'gridiron lay-out'. But the general orientation of all structures, except that in trench 'M', is according to the cardinal directions. The same system of 'turning corners' may be recognised on entering the houses. In general there are no straight axes to enter (1979: 414).

Indeed, a review of published excavation plans reveals that the vast majority of the gridiron layout at Harappan sites is represented by dotted lines through unexcavated areas rather than the solid lines of actually excavated streets. One cannot help questioning to what extent the presumed existence of a gridiron street plan has influenced the placing of these "dotted line" streets through unexcavated areas. The existence of a cultural norm prescribing the orientation of all buildings according to the cardinal directions would of itself produce a superficial "gridiron pattern," without the existence of centralized authority or a developed sense of town planning. As with the so-called granaries, the current assumptions about Harappan town planning are not clearly warranted by existing archaeological data. If the more usual interpretations of Mature Harappan Culture are insufficient, it is best to re-examine the available data to see if alternative explanations may be proposed.

ALTERNATIVE EXPLANATIONS

One of the more striking aspects of Mature Harappan material culture is the quantity of metal objects. Excavations produced almost 2000 metal artifacts at Mohenjodaro over 1000 at Harappa. No doubt if more detailed excavation techniques had been used, and all the more fragmentary metal examples recorded, the count of metal artifacts would have been even larger. Even the small Harappan site of Allahdino has a tremendous number of metal artifacts. Types of metal smelted by the Mature Harappans included copper-bronze, gold, silver, lead and more rarely electrum. The ratio of functional to non-functional (jewelry) items is difficult to determine since a single necklace or belt can contain hundreds of metal beads. However, if one discounts beads, there appears to be a very high incidence of functional metal tool types (i.e. points, knives, chisels, etc.). It is difficult, of course, to definitely ascribe a utilitarian status to these objects, however, two associated aspects of these artifacts suggest their utilitarian nature. Agrawal's (1971: 168) study of metal artifacts indicates that the process of alloying was understood, although the bronze objects demonstrated a wide variation in the percentages of metals added to copper to make bronze. He found that tin-bronze was mainly confined to knives, axes and chisels, with other objects having a lower percentage of metal additives. He feels that this reflects an inability by the Harappans to control the correct metal proportions which, indeed, may have been the case. At the same time, this differential ratio of copper to other alloying metals may reflect functional variations. In other words, tool types whose utilitarian function would have benefited from hardness would have the higher amounts of metal additives needed to produce that hardness. Tool types whose utilitarian function was not so dependent upon hardness had smaller amounts of metal additives. A combination of tin-bronze confined to tools such as chisels and axes reflects a cultural decision in the same way that tools whose utilitarian function was not dependent upon hardness but on sharpness (i.e., points, razors, fishhooks, etc.) would have had fewer metal additives. Given the rarity of tin in the environment, metalsmiths may have been forced to make the most economical use possible of this rare metal. Varying ratios of copper to other metals in the manufacture of bronze objects may not reflect technological limitations, but rather a detailed knowledge of how to produce a functional utilitarian object with the greatest economy of materials.

Two recent studies (Hoffman and Cleland 1977; and Cleland 1977) of the lithic artifacts from Harappan and related sites (Amri, Kot Diji, Sarai Khola, Gumla, etc.) also support the hypothesis that manufacture of metal objects in a Mature Harappan context was directed toward the production of functionally utilitarian items. Cleland came to the following conclusion after an extensive analysis of the lithic artifacts from Early and Mature Harappan sites:

> Lithic technology during this period declined quantitatively and in terms of functional variabi-

> lity. Although still important in production, the number of tasks in which chipped stone tools were used declined. Contemporaneously utilitarian copper-bronze tools became widely distributed. It has been suggested herein that these two trends were causally linked, i.e. that metal tools were replacing stone (1977: 175).

In their analysis of the Allahdino lithics, Hoffman and Cleland came to a similar conclusion:

> Not only in the general paucity and simplicity of its lithic industry, but in specific morphological categories, such as point tools and heavy-duty cutting tools, Allahdino presents a striking contrast to other Chalcolithic and Bronze Age sites to the west. We strongly suspect that this general poverty, far from belittling the general level of Harappan industry, hints at the greater importance of copper/bronze tools in the Harappan world at a time when they were apparently the plaything of the elite classes farther to the west. Perhaps this difference is merely an artifact of differing techniques of recovery, but, at this point in time, there is good reason to suspect that copper and bronze tools were not only relatively more abundant in Harappan society, but were manufactured and redistributed according to a basically different set of social and economic rules (1977: 60).

It is very likely that Harappan metal tools were manufactured and distributed so that they could be utilized in daily utilitarian activities. Metal tools were thus a part of the utilitarian activities performed in both the large urban centers such as Mohenjodaro and the much smaller, seemingly more rural, settlements such as Allahdino.

The utilitarian nature and the broad-based distribution of these metal objects within the social group is indicated by the context in which they are found distributed within a site. As noted above, Fentress states that the highest frequency of metal objects was in the habitation area at Mohenjodaro—not in the high mound with all of its public or monumental architectural units. Similarly, at Harappa, Fentress states that metal artifacts are relatively evenly distributed throughout the site, rather than being concentrated in any particular area. At Allahdino, as at Harappa, metal artifacts were found distributed throughout the site in a variety of contexts: inside structures and outside structures (in streets, drains, and trash deposits). Even a gold, silver and carnelian beaded belt crammed into a small, plain red jar was located on the floor of a structure. At present there appears to be no definite association of metal artifacts with any particular area of a Harappan site or type of architecture within a particular site. Although the sample is limited, another striking characteristic of Harappan metal artifacts is their rare occurrence in graves. Other than a few beads or blades, metal objects are seldom found associated with burials. Precious and semiprecious stone objects are also rare in Harappan cemeteries. These stone artifacts seem to have similar characteristics of distribution and context in Harappan sites as the metal artifacts, i.e., in all places. To sum up, it appears that except for obvious items of jewelry, metal artifacts were manufactured for use in daily activities and were available to a broad segment of Harappan society, urban or rural. A similar distribution and access to items manufactured from semiprecious stones may also be postulated.

Other data shedding light on the Mature Harappan Culture are emerging from the Allahdino excavations. All major categories of Harappan material culture, except anthropomorphic figurines, have been located in quantity at this small site. This includes semiprecious stones and precious metals. Structures at Allahdino are oriented to the cardinal directions, separated by streets, and are functionally distinct (although at present one is unable to make specific functional designations). Numerous hydraulic features, including drains, wells and bathrooms, are found. One large structure with a mud-brick platform at one end and a deep well at the other may represent some type of public architectural unit. Absence of any indication of local manufacture for most objects of material culture found at the site indicates that the inhabitants of Allahdino had access to, and participated in, the extensive Harappan internal trading noted earlier (see Shaffer in press). Yet another significant aspect of Allahdino was the location of several seals, one sealing, and several examples of Harappan script incised and painted on potsherds. These examples of Harappan script located at Allahdino suggest that literacy was present in a small site context and may have played an important part in daily activities there. The point to note is that qualitatively there is little difference between Allahdino and the large urban centers of the Mature Harappan Culture such as Mohenjodaro. All the essential characteristics of the urban center are duplicated at this smaller site, including literacy. It would appear from the available data (albeit it is limited) that there was no sharp cultural dichotomy separating the large urban centers and smaller, presumably rural, settlements (see Fairservis 1975: 299-300).

From this brief discussion, a very different picture of the nature of the Mature Harappan Culture is beginning to emerge. Traditionally early urban literate cultures are associated with the development of pronounced social stratification and concentration of wealth and power in the hands of few social, presumably hereditary, elites. Archaeologically, this type of social pattern is symbolized in the appearance of "palaces," "temples," and "royal tombs" with associated wealth objects (metals, semi- and precious stones, works of art, etc.). Metal objects in the Mesopotamian context are usually interpreted as representing status symbols, and as a means of concentrating wealth in a limited number of relatively portable objects. The function of metal artifacts in early Mesopotamian cultures is viewed as being mainly symbolic rather than utilitarian. This is a distinct contrast to the Mature Harappan Culture where the primary function for a vast number of metal artifacts appears to have been utilitarian rather than symbolic. Such a contrasting difference in functional roles for metal artifacts is in part due to the fact that the distribution zone for the Mature Harappan Culture incorporates areas which contained natural deposits of these metals. Therefore, metal artifacts were more readily available to Mature Harappans than they were to Mesopotamian groups, which had to obtain metals from geographically and socially foreign areas. Indeed, all of the commodities associated with wealth and status in Mesopotamia can be found within the distribution zone of the Mature Harappan save two: lapis lazuli and tin. It is clear that the emphasis for the Mature Harappan Culture was upon internal exchange and distribution rather than external exchange. Mention must be made here of the recently discovered Mature Harappan site of Shortugai on the Oxus River in Afghanistan. This site has been quickly interpreted by some to demonstrate the importance and existence of external trade for the Harappan Culture (Kohl 1978). However, as argued elsewhere (Shaffer in press), this site could equally represent an attempt by the Harappans to incorporate more effectively a commodity not found (lapis lazuli and perhaps tin) within the geographical boundaries of the existing internal exchange network. If external trade, or interaction with foreign cultural groups, was a primary purpose for the settlement of Shortugai, then the relative paucity of Harappan type objects in the contemporary sites of Turkmenistan is puzzling. Even more puzzling in this respect is the absence of any Harappan type artifacts at Shahr-i Sokhta, Mundigak, Said Qala Tepe, and Deh Morasi Ghaundai which are geographically closer to the Indus Valley. I do not deny, however, that some form of direct, or more likely indirect, contact took place between the Mature Harappan and cultural groups located to the west. Such contact is documented by the few Harappan artifacts found in Mesopotamia, and more recently, at Tepe Yahya (see Chakrabarti in press for discussion). What I do maintain is that external exchange networks did not have the same socioeconomic significance in the Mature Harappan context that they did in Mesopotamia or the Iranian Plateau, and that for the Mature Harappan Culture, the development and maintenance of internal networks is a critical issue for understanding the cultural processes at work in the greater Indus Valley.

The production of objects of personal adornment (jewelry) from metals and semiprecious stones indicates, however, that such commodities were not entirely without symbolic meaning for the Mature Harappan Culture. Beads, mirrors and pins would have little utilitarian value in the harvesting of grains or the building of a house. Yet, the frequency and distribution context of these objects also indicate a significant cultural contrast with Mesopotamia and other groups to the west. Since such objects have little utilitarian value but, at the same time do represent a considerable technological effort in manufacture, their acquisition very likely bestowed some social distinction on the social unit (individual or group) able to procure them. That such objects, and metal tools also, could be accumulated is indicated by finding occasional clusters of these items within a site (or "hordes" as they are commonly called). Unlike cultures to the west, such items in the Mature Harappan context are not found in association with any particular type of architecture, area of the site or burials. The absence of such objects in most burials, and their statistical insignificance when found in burials, is important to note. Although such items may fall within the cultural category of "wealth objects," the distribution of these objects within the social group was quite different between the Harappan and western cultures. The failure to define specific contextual associations for these items indicates that a relatively broad segment of Harappan society had access to and the ability to procure such objects, unlike in Mesopotamia where the distribution of such items was increasingly restricted to a limited range of social units. Absence of such objects in Harappan burials may indicate that: (1) such wealth objects were not hereditary; (2) they were not considered particularly important indicators of social status; (3) the objects were redistributed at the time of death; (4) There was an absence of well-defined social stratification; or (5) some other cultural rule at present unknown was at work designating their presence or absence in burials. If wealth was not hereditary, or if wealth and power were constantly fluctuating between units of any social group, this might also account for the inability to identify "palaces," "temples" or "royal tombs" in the Harappan context. At present, however, the data are too limited to form a more comprehensive picture of the nature of the Mature Harappan social organization. The data do indicate that if pronounced social stratification was present in Mature Harappan Culture, it is reflected in a different, as yet undetected, set of archaeological traits than is the case in Mesopotamia. And, it is quite possible that the "road" to an urban literate culture in the Indus Valley represents a unique achievement in urbanization. It could be that in the Indus Valley, a technologically advanced, urban, literate culture was achieved without the usually associated social organization based on hereditary elites, centralized political government (states, empires) and warfare.

No overview of the Harappan Culture is possible without some reference to its final phase—the Late Harappan. This is the most poorly understood period of Harappan cultural development. It is often referred to as a period of "decline" or "degeneration" which witnessed the end of urban centers in this geographical area. Such an interpretation reflects the dominant influence of the cyclic model of cultural development: what is born must eventually die. Moreover, the archaeological sequence of events in the Sind (especially those recorded at Mohenjodaro) have to a great extent governed interpretations for this phase. Yet, Late Harappan sites have a very broad distribution within the geographical area recorded for Harappan Culture. The data on the Late Harappan is so limited that only the barest essentials of chronological boundaries and material culture traits are known. Certainly, such subjective evaluations as "decline" and "degenerate" are unwarranted until a fuller archaeological record is available for examination. Cultural changes distinguish the Late from the Mature Harappan Phase, but the exact nature of these changes and the processes responsible for them are at present unknown. Even the often stated disappearance of urban centers noted for the Late Harappan is an assumption. While urban centers may have ceased to exist in the Sind, it is impossible to assert that this was the situation for the entire area covered by the Harappan Culture during this phase. Certainly, until some of the large Medieval and Early Historic sites which also have associated Late Harappan ceramics are excavated, and the extent of the Late Harappan settlement determined, it is inappropriate to conclude that urban centers were absent during the Late Harappan Culture. A systematic research program involving large-scale, horizontal excavations at Late Harappan sites is one of the most critical needs in South Asian archaeology today.

CONCLUSION

This discussion has attempted to demonstrate that the uncritical application of cyclic models of culture change in general, and those developed for Mesopotamia in particular, to Harappan Culture has resulted in significant distortions about the nature of the Harappan Culture. Early interpretations of the Mature Harappan Culture have been uncritically accepted and propagated to the extent that preconceived notions about the nature of Mature Harappan Culture have significantly influenced interpretations of archaeological data, both new and old. Together, these factors have resulted, I believe, in an overall theoretical stagnation concerning analysis of the data available on Mature Harappan Culture. For too long, one has let preconceived notions about the nature of Harappan Culture dictate what the archaeological data will reveal. It is time to view the archaeological data for what it is, and not what one thinks it is. Recent studies are just beginning to indicate the real importance of Harappan studies, showing that in South Asia, a unique experiment in the development of urban, literate culture, was underway. Such a culture was highly attuned to local conditions and not a mirror image of Mesopotamia's urban experiment or, for that matter, of any other region which witnessed the development of comparable cultural achievements.

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S.P. GUPTA

3. The Late Harappan: A Study in Cultural Dynamics

PART I

WHAT happens when the urban fabric of a culture disintegrates? People, by and large, leave the urban settlements and migrate elsewhere. Similarly, material culture becomes poor. But what items of culture are still prone to persist? Is there any pattern in this process? Two case studies are being undertaken to answer these questions. One from India and the other from Soviet Central Asia: the Harappan Culture Cycle and the Altin Culture (Namazga V Bronze Age) Cycle. These examples, it is hoped, will explain, at least partly, the dynamics of the Late Harappan Culture complexes. In this context one more question is touched upon in light of the fact that, broadly speaking, both Soviet Central Asia and India passed through two cycles of urbanization; the first belonging to the third millennium and the second belonging largely to the late second and early first millennium. Are any proccesual parallels observed between the two otherwise independent cycles? One may go even a step further and ask if at some point in time they converged. After all, these two dynamic areas are geographically not far removed. In fact, there are a few definite pieces of evidence to show that the cultures in these regions interacted closely.

To begin with, during the Late Bronze Age there was a marked decrease in human occupation in the traditional strongholds in these two culture areas. This followed a period of fluorescence. In Turkmenia, Altin Depe was reduced from 114 to three acres and Namazga Depe dropped from 170 acres to 3.5 acres (Gupta 1979 II: 175ff.). In eastern Iran at Shahr-i Sokhta the occupied area shrank from 80 hectares to five hectares (Biscioni, Salvatori and Tosi 1977). In the Indian Subcontinent, Mohenjodaro was reduced from 85 hectares to approximately three hectares, and Lothal was reduced from 4.75 hectares to approximately two hectares. Thus, broadly speaking, during the Late Harappan period of the second millennium the population decreased considerably on most urban settlements. While some people may have perished, others seemed to have migrated to different places. It is equally possible that some sites were only temporarily deserted and some people may have vainly gone back to the old towns, while others may have been attracted to other villages existing in the neighborhood. Some may have even broken ground and founded new settlements. In fact, the number of people who did the latter appears to be the largest. Those who struggled hard to remain in the towns sometimes occupied areas nearby or only a portion of the old settlement because of limited population and economic resources. Examples of all these patterns are available in archaeological record.

At Mohenjodaro there are several cases of violent death (Marshall 1931) and uncared-for dead bodies (Dales 1964). A number of Pre- (or Early) Harappan sites in Haryana and Bahawalpur are found to have been occupied by the Late Harappans, some of whom may have been those who had deserted sites like Harappa and Kalibangan; although this is not always easy to prove archaeologically. Sites like Chanhudaro and Harappa were, however, occupied by two different kinds of "Late Harappans," the Jhukar and the Cemetery H People, respectively; after, of course, a definite break in occupation. At places like Mitathal in Haryana, the Late Harappans occupied the Siswal (a Sothi or Kalibangan I complex) village (Bisht 1976a: 21). In recent years Suraj Bhan and Shaffer (1978) have located 59 Late Harappan sites (single culture sites, showing in unmistakable terms the occupation of new lands) in a comparatively small area of Haryana between the towns of Narwana, Yamuna Nagar, Jind and Panipat. In Haryana, as a whole, up to 1977, Suraj Bhan (in press) counted 133 Late Harappan (Mitathal II B) sites: 43 in the Sarasvati Valley, 51 in the Drishadvati Valley, seven in the Sabi Valley and 32 in the Yamuna Valley. It is significant to note that in the same region there are only 36 Mature Harappan sites (Late Siswal): three in the Sarasvati Valley, 22 in the Drishadvati Valley, three in the Sabi Valley and eight in the Yamuna Valley. At Banawali the Late Harappans (sometimes called Post-Harappan) occupied areas partly used by the Harappan settlers and partly beyond those fortifications (Bisht 1978: 87). At Shahr-i Sokhta (Biscioni, Salvatori and Tosi 1977) the post-firing period (IV: 2000-1800 B.C.) witnessed the occupation of only pockets of the town, that is, the southeast and northwest edges of the central plateau. In Period III the occupation shifted from the eastern residential areas to one in the west.

From these examples the next notable fact that emerges is that the regions which had once been "centers of attraction" became, during the Late Harappan times, "areas of isolation." The lower Indus and the Ghaggar-Hakra basins which were thickly inhabited during the Mature Harappan times, were now thinly populated.

Now, when does an "area of attraction" become "an area of isolation"? Scholars usually take it to be an ecological phenomenon because a shift of this kind is usually seen in the perspective of geographical model (Subbarao 1956). But, the process of disintegration of the Harappan Culture discussed here is primarily a cultural phenomenon. Environmental causes were secondary. If environmental factors had been decisive in the downfall of civilizations, Mesopotamia would have been deserted long ago, since hydrological changes were quite pronounced there. The geological record indicates that only parts of Rajasthan (Sambhar Lake) and Sind (i.e., the arid and semiarid areas) experienced a short dry period from 1800 B.C. to 1500 B.C. (G. Singh 1971: 188-89). There is absolutely no evidence of any major climatic change affecting the Punjab, Haryana or Gujarat This, of course, does not negate the pressure of local hydrological changes, such as the one that the Ghaggar-Hakra system experienced (Raikes 1964; Wilhelmy 1969). Therefore, it is only when the social fabric of a culture begins to disintegrate that urbanism cannot be held fast and areas of attraction are reduced to areas of isolation. Natural causes are contributory, not decisive in this process. The Late Harappan, at least in areas beyond the extreme arid and semiarid belts, is, therefore, to be viewed primarily within a process of "cultural disintegration" and "cultural transformation" or "cultural readjustment," and not as a product of catastrophic climatic change coupled with the mythical invasion of the Aryans or even the migration of barbaric nomadic hordes from Iran. It may, however, be reiterated that local hydrological changes may have adversely affected the prospects of a few local towns such as Kalibangan where such changes hastened the people to leave their traditional metropolises (Lal 1979: 95). This inference is fully supported by the fact that the areas which are supposed to have experienced the greatest hardship due not to aridity, but to floods (Raikes 1964), for example the towns below the Sukkur barrage (Mohenjodaro, Chanhudaro, etc.) have yielded evidence of Late Harappan occupation. Other regions, such as the Punjab and Rajasthan, where Harappa and Kalibangan are located, have not yielded evidence of Late Harappan occupation. The settlements were deserted once and for all during the Mature Phase of the Harappan Civilization. Even if the desertion of Kalibangan is assigned to a shift in the Ghaggar River (Lal 1979) no such argument can be valid for Harappa on the Ravi.The desertion of Harappa shall remain enigmatic to hydrologists since it can be explained only on socioeconomic grounds. These are, of course, not as convincingly verifiable as the hydrological postulates; but such inferences are quite obvious to archaeologists.

Now, if the cultural decline of a people is accompanied by sociopsychological aversion to the land on which they lived earlier; or, if during the period of decline the people were pressed because of a marked fall in the productivity of the land due to human factors, such as overgrazing, etc., the diffusion of a population follows. In Soviet Central Asia, the Altin people moved into the Murgab Valley and colonized it during the Late Altin or Namazga VI (Gupta 1979 II: 180) times. In Rajasthan the Ghaggar basin was, by and large, deserted, and the Harappans moved toward Haryana in the east. In Gujarat a slightly different kind of situation is met with, probably because it is devoid of large rivers like the Indus and Ghaggar. Here, there was a sudden spurt of new settlements during the Late Harappan. For example, there were only about 13 sites of the Mature Harappan Period in the entire state. But Rajkot District alone has 20 Late Harappan settlements (Chitalwala 1979: 115). The same is true of other areas as well (Possehl 1974) and there are now over 200 Late Harappan sites in Gujarat. Obviously, the limited number of Mature Harappan sites could not disintegrate into so many settlements, even conceding the possibility of a higher population growth rate for this period, because the Gujarat Harappan sites were very small as compared to the Sind and Punjab sites (Chakrabarti 1979). Lothal may not have accommodated more than 2,000 to 3,000 people during its peak period. Mohenjodaro, on the other hand, may have had a population of 40,000 to 50,000 people during the same period (Fairservis 1967: 33; Chakrabarti 1979). The larger number of Late Harappan sites is, therefore, to be seen as resulting from a process of social disintegration followed by geo-cultural readjustment by a people in the same area which had once witnessed a few urban centers.

A somewhat similar phenomenon is observable in eastern Haryana (U.V. Singh in press; Suraj Bhan 1973, 1976, in press; Suraj Bhan and Shaffer 1978) and western Uttar Pradesh (Dikshit in press; 1979a, 1979b). There are only two or three Mature Harappan sites in these regions while the number of Late Harappan sites is about 60. If the so-called OCP sites are included (e.g., Ambakhedi and Bahadarabad) the number increases to more than 75. It should be noted that for our purposes OCP is, in fact, a Late Harappan variant.

The upper plains of the Ganga-Yamuna *Doab* held 50 sites as of 1972 (Deshpande in press) none of the status of even a small town. It is, however, extremely significant to note that most of the sites found in Saharanpur District are located at a distance of eight to 12 kilometers from one another and their occupational deposits are not more than 0.75 to 1.50 meters. The Late Harappan sites in the adjoining District of Muzaffarnagar are equally small and located in small river valleys after every eight kilometers or so.

In the wake of the movement of people and the occupation of new lands pockets of new settlements can develop, particularly in areas once deserted. In the submontane region of Soviet Central Asia a few sites were redeveloped (Gupta 1979 II: 180 ff.). Similarly, in India the Bahawalpur region on the Ghaggar was reoccupied during the Late Harappan, Cemetery H times. A pocket of more than 72 sites developed in a small area of Cholistan, with the greatest concentration in the vicinity of Derawar. Significantly enough, the same area produced a number of Mature Harappan sites but only a few Early Harappan settlements (Mughal 1978, 1980). A small pocket of Jhukar settlements also developed in Sind at places like Jhukar, Amri, Mohenjodaro and Chanhudaro (Fairservis 1971: Appendix F).

Why do settlement pockets develop and how do they differ from newly founded sites resulting from diffusion, sometimes called "colonization"? Archaeological evidence appears to favor the theory of "past association." That is, an emotional attachment to the region in which a group of people had once lived may once again bring them to the area; of course, only if environmental conditions favor it. In other words, this precludes serious environmental constraints. In such examples a love for traditional items is inherent, i.e., things of the past reappear, though not always in identical terms. Thus, such sites are prone to show a continuation of old traditions much more effectively than newly poineered sites do. This appears to be the reason that Cemetery H and Jhukar sites have more Harappan affinity (Mughal 1980) than those of the Late Harappan in Gujarat, Haryana and Uttar Pradesh (Dikshit 1979a, 1979b). This also probably explains the adoption of Harappan painted designs by the Rang Mahal people, some 2000 years later (Rydh 1959), in the early centuries A.D.

This phenomenon has, of course, also been explained by the dictum "the farther something is from the center, the more dilute its character will become." For example, the Late Harappan sites of eastern Haryana and western Uttar Pradesh are distantly removed from Harappa, and, therefore, they do not show a very close Harappan affinity. But this is too simple an explanation. First, there is not as much difference between the settlement patterns of Haryana and the Indus as is sometimes asserted. Second, the settlement of Rakhigarhi was in no way smaller than Harappa. Banawali and Balu were also sizable (Suraj Bhan in press; Bisht 1976b; Suraj Bhan and Shaffer 1978). Finally, it was the process of deurbanization, coupled with diffusion in time and space, which inherently caused the loss of more and more Mature Harappan features.

The Late Harappan problem in the Punjab, particularly in the Sutlej basin, at sites like Ropar, Bara, Sanghol, Katpalon, Nagar, Dadheri and Chandigarh, is extremely complex. Bisht (1976a) sees Cemetery H pottery in Sanghol IB. Joshi (in press) says that Nagar and Dadheri have a typical Late Harappan complex. Dikshit (1979a, 1979b) finds OCP plus Late Harappan at Katpalon. Y.D. Sharma (1976) is not favorably inclined to these observations; instead, he takes all of them to the Pre-Harappan Bara traditions. However, he (Sharma in press) agrees with Suraj Bhan that at places like Mitathal (II B) in Haryana, the Pre-Harappan Bara pottery belongs to the Late Harappan times. As indicated elsewhere (Gupta 1975-76) the Pre-Harappan complex in the Punjab (Sutlej basin) came, in all probability, from Rajasthan (Kalibangan) and it is possible that even the Harappan and Late Harappan were later than the Ghaggar basin facies.

There are also Harappan sites on the western borderlands of the Indus Valley, in the hilly tracts of Baluchistan and Afghanistan. With only a few exceptions, however, the borderland sites were "secondary" in the sense that they were established as posts for commercial purposes (e.g., Shortugai), or they were small stray settlements such as Pandi Wahi. Other settlements in this area were like Mundigak. These were basically local culture sites with some Harappan elements. Their ability to survive was determined by the existence of sizable Mature Harappan sites in the foothills and the Indus basin. Places like Dabar Kot, Gumla and Rahman Dheri, sustained them economically and, possibly even socially. Obviously, with the decline of large Mature Harappan settlements the other borderland sites could hardly sustain themselves. Thus, the Late Harappan, as understood from more central areas, simply did not exist in the Baluchistan-Afghanistan hilly tracts.

The picture that emerges from this discussion is that when a civilization of the Harappan type declines due to forces other than political (i.e., invasion, etc.) a definite culture process (diffusion, etc.) sets in. This leads to new settlement patterns, such as the clustering of villages in newly occupied areas, which are clearly identifiable in the archaeological record. The emergence of the Late Harappan was thus not a haphazard process. There were conscious efforts on the part of the people to readjust their life to the new hydrological and socioeconomic conditions which the second millennium brought to the Indian Subcontinent.

PART II

The second question posed at the outset was: What items of material culture are prone to *persist* when urban cultures decline? But before this is answered let a counter question be entertained as well: What items of material culture are lost easily and quickly, or even gradually and what conditions promote this? The following is suggested as an answer to these questions.

Public structures, large domestic buildings, objects of fine art, trade items from distant lands (both raw materials and finished goods), drainage systems and other civic amenities, and, of course, writing, seals and other items of authority are lost earlier than other items. There is a reason for this. Urbanism is a product of material prosperity regulated by political authority through its control of economic channels and organs of corporate life, such as guilds of professionals, and municipalities. The Late Harappan levels of Mohenjodaro clearly demonstrate the breakdown of the machinery that controlled trade and civil government. That is, squatters houses were built over the granary as well as over the citadel without any regard to municipal regulations (Marshall 1931). After some time even these houses were deserted.

Does this mean that when the urban fabric of a culture disintegrates nothing worthwhile in it is prone to *persist*? Unless violently suppressed over several generations, this does not appear to be the case. It is more so when the decay is gradual. What actually happens is that people try to preserve, and they most consciously put all their efforts to preserve their oral traditions, such as mythology and folk songs. This is an area where political efforts are not needed at all. But this is not easy to prove archaeologically, unless some kind of written record or objects of plastic art are preserved, and this is seemingly not the case with the Harappans. In the Late Harappan, both are by and large absent except, of course, for a few terracotta figurines. There are too few of these for any generalization. In addition to oral traditions, some crafts may also persist, but on a reduced scale. The small amounts of metal and faience from places like

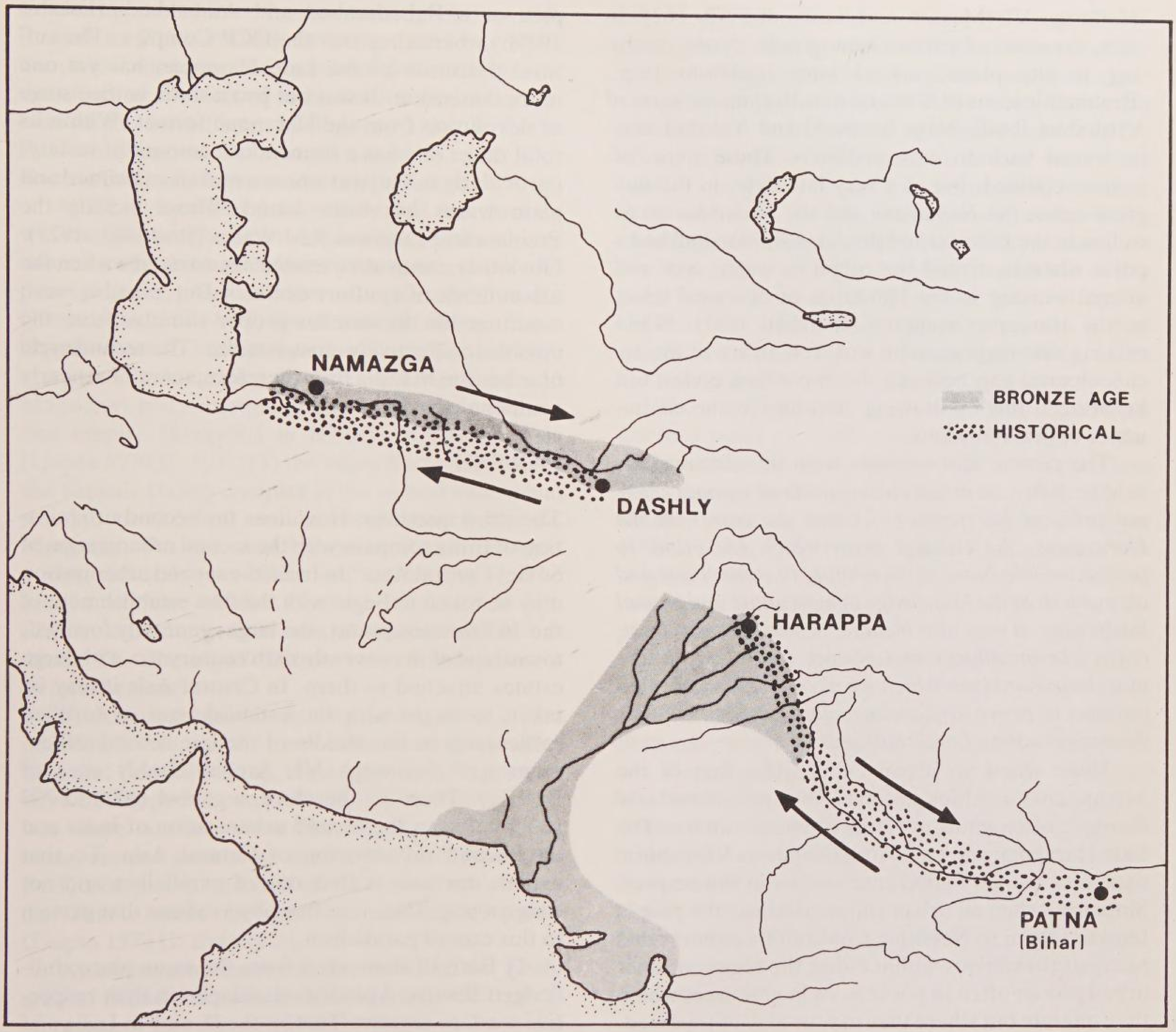

Fig. 3.1. Bronze Age and historical patterns in Central Asia and India.

Rangpur IIB-C, Lothal B, Dadheri, and Bhagwanpura indicate this. There also are uninscribed seals from Jhukar, another Late Harappan complex. Agriculture and animal husbandry, basic to the subsistence economy, is also generally preserved, albeit sometimes a little altered. Techniques for making huts, mud and mud-brick houses of one or two units are also preserved. Thus, phenomena like the Late Harappan represent village cultures which have inherited certain crafts and techniques as well as a large corpus of oral traditions from the preceding urban stage. One of the real strengths of such cultures is their wealth of traditional history and lore which can also be augmented with fresh formulations. Whether the Vedic traditions belong to the Late Harappan Phase or not, traditions of this general kind did belong to such cultural forms. Pundit Madho Swarup Vats, the excavator of Harappa, tried to see Vedic concepts and rituals dealing with life after death in the painted panels on burial jars from Late Harappan Cemetery H (Vats 1940). The same concepts can be traced to the Avestan traditions when considering

Namazga VI (Masson and Sarianidi 1972: 162). In fact, the roots of various iconographic forms emerging in the plastic art of later traditions (e.g., Brahmanic icons of Śiva and non-Brahmanic icons of Vrishabha [bull], Naga [serpent] and Yaksha) may be traced back to oral traditions. These were, of course, codified, but at a very late date, in the two great epics, the *Ramayana* and the *Mahabharata* as well as in the *Puranas* and the *Jatakas*. Marshall had a point when he traced the origin of water, tree and animal worship in the Hinduism of historical times to the Harappan complex (Marshall 1931). While making this suggestion he was well aware of the archaeological gap between the two urban cycles; but he bridged this by drawing attention to the continuance of oral traditions.

The picture that emerges from this discussion is simple: *When an urban culture declines without external political interference, as was the case with the Harappans, the cultural items which are prone to persist include basic crafts relating to stone, bone and clay as well as the knowledge of agriculture and animal husbandry. It may also include, in some areas at least, crafts like metallurgy and glazing (faience). But the most important item which we may not always be in a position to prove archaeologically, save indirectly, is the preservation of oral traditions.*

Thus, when an urban culture like that of the Harappans or Altins declines, in terms of material items, it often gains in terms of moral culture. The Late Harappan and Late Altin (Namazga VI) cultural dynamics are very good case studies in this respect. Similarly, when an urban culture declines the people tend to return to Neolithic-Chalcolithic patterns and readjust themselves within either the region of their urban phase, often in pockets, or in new areas where they migrate but where they may or may not succeed. There are examples of both. For example, in the Rajkot District of Gujarat the new settlements remained small and apparently lacked substance (Chitalwala 1979). In Haryana some of the settlements did very well (Joshi in press; Suraj Bhan in press; Suraj Bhan and Shaffer 1978), sometimes surviving through the Early Iron Phase. At other times they wore out under their own weight. Sometimes they came into contact with new cultural styles and gave forth new dimensions in the process of acculturation. This can be clearly observed at Bhagwanpura in Haryana where the Late Harappan came into contact with the Painted Gray Ware complex or a Bahadarabad and Ambakhedi (Dikshit 1979b) where they met the OCP Complex. The cultural dynamics of the Late Harappan has yet one more dimension. It was not just a static unified stage of devolution from the Harappan format. Within its total range one has a tremendous amount of variety, particularly in Gujarat where a mosaic of painted and plain wares has been found. These include the Prabhas and Lustrous Red Wares (Rao 1961, 1973). Obviously, innovative tendencies do not die when the urban fabric of a culture declines. But, possibly, such a culture has to wait for proper stimulus from the outside to effectively cross-fertilize. The second cycle of urbanism in India had, therefore, to wait for nearly a millennium, if not more.

PART III

The third question: How does the second urbanization of India compare with the second urbanization of Soviet Central Asia? In India the second urbanization may be taken to begin with the firm establishment of the 16 *Mahajanapadas*, the large, generally fortified, townships of the seventh-sixth century B.C. with large estates attached to them. In Central Asia it may be taken to begin with the establishment of fortified settlements in the middle of the late second millennium B.C. (Namazga VI, Sappali-Dashly sites of Bactria). There is, therefore, a gap of 1,000 to 700 years between the second urbanization of India and the second urbanization of Central Asia. To that extent, our case is thus one of parallelism and not congruence. There are five observations that pertain to this case of parallelism.

1) Both of them start from the same place: full-fledged Bronze Age cities developed in their respective western regions. That is, the Punjab in India and South Turkmenia in Central Asia. But, the second cycle of the Late Bronze Age-Early Iron Age cities developed in the eastern region: Uttar Pradesh and Bihar in India and Bactria in Central Asia and Afghanistan.

2) The cities of the first urbanization in this part of the world developed in *both* large river valleys (the Indus) and in the smaller submontane river basins (Kopet Dagh rivers). During the second urbanization only large rivers and their tributaries fostered the growth of cities—the Ganga system in India and the Oxus system in Central Asia and Afghanistan.

3) While the diffusionary direction of the first

urbanization was from the west to the east (from the Punjab to Uttar Pradesh in India, and from Turkmenia to Tadjikistan in Central Asia) the diffusionary direction of the second urbanization was from the east to the west (from Madhyadesh, that is, Uttar Pradesh/Bihar to the Punjab in India, and from Bactria to South Turkmenia in Central Asia).

4) While it cannot definitely be said that the king was the pivot of the first urbanization, for the second urbanization this can definitely be asserted; the emperor was the pivot, at least to begin with. In India (Majumdar 1951: 1-35) the directional change in polity ran from 16 *Mahajanapadas* (Kasi, Kosal, Vrijji, etc.) to four kingdoms (Kosala, Avanti, Vatsa and Magadha) and subsequently, from four kingdoms to one empire (Magadha in Bihar). In Central Asia (Gupta 1979 II: 194-219) the many Bactrian towns of the Sappali-Dashly complex of the second millennium B.C. led to the four ancient kingdoms of Bactria, Margiana, Parthia, and Hyrcania. These emerged during the early part of the first millennium B.C. The unified empire of the Persians of the sixth-fifth century B.C. emerged, in turn, from these four kingdoms. *The directional changes were, therefore, more or less the same.*

5) Although one is dealing with a case of the parallel development of two cultural complexes (Indian and Central Asian), these areas do not appear to have developed in complete mutual isolation. There was some contact, some filtering of cultural traits, some mutual awareness during the Late Harappan Period of the second half of the second millennium B.C. This is borne out from the following few points (Gupta 1979 II: chapter 3):

At Mehrgarh, on the Bolan River in the Kachi area of Baluchistan, there is a cemetery with typical Namazga VI or Sappali-Dashly (same as Bactrian) pottery, including bowls-on-stand and pedestaled bowls. At Ghaligai, and several other sites of the Gandhara Grave Culture, there are a few comparable Bactrian bowl shapes in Stratum V of 1400-800 B.C. Although at our present stage of knowledge none of these shapes appear to have come to northern India, the east of the Indus, two things may be noted for future guidance. The first is the occurrence of pedestaled bowls at Post-Harappan Chalcolithic sites of the second millennium B.C. such as Navadatoli in Central India (Sankalia 1974: 434 ff.). The second is the occurrence of Saka-Parthian red ware and bronze, open-mouthed pedestaled cups at Taxila (Marshall 1951) during the first century B.C./A.D. These examples are apparently meaningless because of the marked space gap in the former case and great chronological divergencies in the latter example; but, as noted at the outset, these are noted here only for future reference. The reason is that in the Indian context, as Prof. Sankalia has repeatedly stressed, these materials are by and large enigmatic in the entire gamut of Indian ceramics. Some explanation has, therefore, to be found for them and it is at this point that the position taken here has real significance. After all, similar cultural processes in two neighboring areas admit, at least theoretically, a situation, irrespective of the time factor, of echo.

The problem has also been looked at from another point of view. Some have thought of the movement of people and ideas from Central Asia into India during the second millennium B.C. in the light of literary evidence in the *Avesta* and *Rigveda* (Gupta 1979 II: 230). This is admittedly a moot point. The original home of the Vedic Aryans is often located outside India, along the northeastern side of the Caspian (e.g., R. Ghirshman). But this is completely rejected by many Russian and Italian authors (e.g., Y.Y. Kuzmina, K.F. Smirov, and M. Tosi; Gupta 1979 II: Appendices). Still the discovery (Jarrige, personal communication) of early second millennium B.C. Bactrian pottery (Dashly-Sappali or Namazga VI) in the graveyards of Mehrgarh goes a long way to prove that the ancient Bactrians did move far and wide, from northernmost to southernmost Afghanistan, and beyond to Baluchistan. The Quetta/Kachi region on the Bolan has the greatest potential for the cultural interaction of many peoples, and sites like Mehrgarh have begun to throw significant light on this problem.

CONCLUSION

The Late Harappan and Early Iron Age of India thus present a very interesting case study when compared to the Late Bronze Age/Early Iron Age of Soviet Central Asia and the Afghan-Iranian borderlands. A cultural process conforming to a definite pattern (eastward diffusion and the creation of pockets of settlements) developed between the prehistoric and historical cycles of urbanization in these regions. A clearer understanding of this pattern, and of its significance, would be most rewarding. At the moment the belief is that the Late Harappan is not at all a new culture complex. It is the result of the breakdown of the urban fabric of the Harappa Culture and, therefore, it represents a stage of readjustment by an urban system to the rural setting without losing its basic ethos which was preserved in oral tradition. The innovations probably lie in some of the Vedic texts and the overall Vedic Culture Complex. In the present paper the attempt has been only to evaluate a mass of disjoined data to arrive at a sense for the broad directional changes which marked the cultural dynamics of the Late Harappan; to be exact, of the second millennium.

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C.C. LAMBERG-KARLOVSKY

4. Sumer, Elam and the Indus: Three Urban Processes Equal One Structure?

In this paper I shall attempt to point out the similarities and dissimilarities in the structural processes that characterized the urban development of the Harappan Civilization, Central Asia, southern Iran (Elam), and Mesopotamia (Sumer).[1] All of these areas are perceived by archaeologists as distinctive centers of indigenous urban and state development which were, at different times, either directly or indirectly in contact with each other (Gupta 1979; Lamberg-Karlovsky and Tosi 1973). Within the last decade it has become evident that developments in one of the above regions affected the cultural systems of neighboring and even distant areas.

The analysis will focus upon the period of early urban formation in an attempt to isolate similar structural processes which characterized each region. Such an attempt moves away from earlier efforts which searched for isolated similarities in ceramics, seals, metals, etc., in order to build a comparative stratigraphy of time-space systematics involved in questions of diffusion versus independent invention. It is the search for structural similarities which characterized each region that leads to the isolation of a general uniform process. If a structural similarity can be found which characterized each area, it is probable that a general explanation is applicable to its understanding.

In order to establish a structural equivalence between the culture areas already noted, I shall contrast within the three distinctive regions, the processes of: (a) primary urbanization, (b) primary incorporation, and (c) secondary involvement. By "primary urbanization" I mean the descriptive process which leads to urbanization within the area under review. "Primary incorporation" refers to the process which brings neighboring communities (at times the colonization of distant communities within distinctive culture areas) under the direct political and/or economic influence of the primary urban center(s). Lastly, by "secondary involvement" I mean archaeological sites which merely indicate an archaeological contact situation, one based on a repertoire of *very* limited typological similarities to distinctively different primary urban centers. Such an approach is necessarily abstract and takes for granted that sites such as Uruk, Susa, Altin Depe, and Harappa were primary urban centers of the Sumerian, proto-Elamite, Turanian, and Indus regions respectively. It is not my purpose to review the process of urbanization in each area, either theoretically or substantively, but rather to review the structure which each process took and compare it with that of other distinctive areas. Such an attempt, preliminary and premature as it might be, focuses upon the structural similarities and differences which characterized each area.

It is fundamentally important to recognize that the development of the proto-Elamite cities of southwestern Iran, though still very little understood, is inextricably interwoven with contemporary developments in neighboring Sumer. This fact is of fundamental significance and sets the first structural difference between the Elamite/Sumerian urban process and that of the Turanian and Harappan. Neither of the latter two culture areas were situated geographically adjacent to, nor chronologically contemporary with, a distinctive, though interacting, urban process of the type that characterized early Sumer and Elam. Sites of southern Mesopotamia (Sumer), such as Uruk, appear to maintain a slight chronological priority over those (i.e., Susa) of Khuzistan (Elam), in the development of writing, defensive structures, and regional hierarchies of settlement. Nevertheless, within two or three centuries the proto-Elamites, as evidenced at Susa, appear to have developed their own distinctive form of writing, settlement hierarchies, and material culture which can readily be distinguished from that of Sumer. Pierre Amiet (1979) has recently offered an interesting proposition for isolating ethnic boundaries separating not only Sumer from Elam but attempting to distinguish such boundary conditions within Elam itself. Amiet writes of Elam:

> Cultural and occasionally political integration into Mesopotamia lasted during virtually the latter part of the third millennium, with the exception of the brief break of Puzur-Inshushinak's reign, when a new script adapted to the national language [Elamite] was adopted and used concurrently with the Akkadian writing and language. This fact is significant in the linguistic and ethnic duality of Susiana.... In addition, during the periods of integration into Mesopotamia a related phenomenon occurred, namely the appearance of national dynasties [Elamite], outside Susa, first in Awan then in Simashki. Finally, exactly as Puzur-Inshushinak, who was to become the last king of Awan, conquered Susa when the dynasty of Agade declined, the kings of Simashki united the Elamite country after the downfall of the dynasty of Ur (1979: 197).

Any consideration which entails a discussion of the urban process in Sumer and Elam *must* take into account the stimulus-response nature of Sumerian-Elamite relations. The ethnic and linguistic diversity which characterized these neighboring communities may have in fact played an important role in setting conditions for conflict, integration, and political centralization within and between Sumer and Elam.

Following the nearly contemporaneous state formations in Elam (Khuzistan) (Wright and Johnson 1975) and Sumer (Adams and Nissen 1972) an identical phenomenon can be observed occurring in each: the incorporation of distinctive cultures into their sphere of influence by *direct* colonization. Thus, by 3200 B.C. the Sumerian fortified colony at Habuba Kabira is established within a distinctive cultural region of northern Syria (Strommenger 1976). Similarly, by 3000 B.C. the proto-Elamites established a colony in the equally distinctive cultural area around Tepe Yahya in southeastern Iran (Lamberg-Karlovsky 1978). These are not the only sites evidencing such colonization by the Sumerians and Elamites. The process is, in fact, a widely recognized one which has been recently discussed by Weiss and Young (1975), Amiet (1979), Strommenger (1976), Lamberg-Karlovsky (1976) and years ago by Ghirshman for the Elamite colonization of Sialk (1954: 45-50).

Structurally one can review the situation this way: Following the *interrelated* processes of primary urbanization and state formation, Sumer and Elam became independently involved with colonizing "foreign" communities. From Elam sites such as Tal-i Malyan, Tepe Yahya, Tepe Sialk, and Tal-i Ghazir, each with an earlier *distinctive* material culture and widely dispersed on the Iranian Plateau, have imposed on them a proto-Elamite colony. From Sumer the sites of Habuba Kabira (Strommenger 1976) and Godin Tepe (Weiss and Young 1975: 1-18) are directly colonized by Sumerians. Both Sumer and Elam, following primary urbanization, undertake an attempt at expansive colonization. The factors that led to the colonization are still poorly understood but an attempt at political expansion to control the resources and populations of foreign areas are typically advanced as the reasons inspiring such colonization.

The attempt at colonization (following primary urbanization and state development) led to the "primary incorporation" of the indigenous culture into the political and economic sphere of the colonizing culture. Thus, there can be no doubt that the site of Habuba Kabira, with its Sumerian material inventory (including tablets), or Tepe Yahya with its proto-Elamite material inventory (with tablets as well) represent a primary incorporation of these previously distinctive culture areas into the respective political and economic spheres of Sumer and Elam. There can also be little doubt that the presence of these colonies within distinctive culture areas led to an acculturative process between the culture of the indigenous populations and the colonizing culture. The effects of this acculturative process, which is referred to as "secondary involvement," may be seen in the isolated presence of a few rare artifacts characteristic of the colonizing culture but found in archaeological sites of the indigenous culture. Examples of this include the single proto-Elamite tablet and limited sealings found at Shahr-i Sokhta or the single tablet from Hissar. Unlike Yahya, neither of these sites was colonized directly. Neither has the full complement of ceramics, seals, sealings, and tablets been found which allows for an identity between Susa and Yahya. Rather, the materials at places like Hissar or Sokhta appear as *rare* instances within an indigenous tradition of material culture. The presence of these rare items on scattered sites around the colony, however, point to a process of acculturation and "secondary involvement" of the nearby region with the colonizing culture. One may now ask whether this structural similarity between Sumer and Elam bears any relationship to the aspects of primary urbanization in the Turanian and Harappan Civilizations.

The important and distinctive nature of the primary urban development which characterized Soviet Central Asia has become a recent recognition, resulting from the research of Soviet colleagues over the past three decades (Masson and Sarianidi 1972; Tosi 1974; Lamberg-Karlovsky 1978).

The Late Chalcolithic Cultures of South Turkmenia, that is the Namazga III and Geoksyurian Culture complexes, suggest an aspect of primary urbanization dated to 3200-2700 B.C. This would be approximately contemporary with or perhaps a century or so later than, the period of primary urbanization and colonization which characterized Sumer and Elam.

Soviet archaeologists have repeatedly attempted to derive the increasing cultural complexity which characterized this South Turkmenian Late Chalcolithic as resulting from a series of tribal migrations from Iran, which were themselves the results of cultural developments in Mesopotamia. The indirect outcome of these tribal migrations emanating from Iran, it is held, resulted in improved irrigation systems, enlargement of house units, and a remodeling of village plans (Masson and Sarianidi 1972). This view, which derives the increasing cultural complexity of Central Asia from Iranian tribal migrations has been aptly criticized by Gupta (1979), Tosi (1974), and Lamberg-Karlovsky (1973). In fact, today most archaeologists follow the views of Khlopin (1974) who was the first Soviet archaeologist to interpret this Late Chalcolithic Central Asian cultural complexity as representing an indigenous urban process with only the most distant, if any, parallels and influences from such sites as Susa, Sialk, Hissar, etc., on the Iranian Plateau.

The primary urbanization which characterizes the Namazga III period is derived from the excavations of Geoksyur I, Chong Depe, and Kahpuz Depe in the Tedzen Delta and from a line of settlements at the northern foothills of the Kopet Dagh mountains: Kara Depe, Gara Depe, Namazga Depe, Ulug Depe, Altin Depe and Serahs.

The increasing number of sites in the Tedzen Delta from Namazga I to III times, the hierarchy of settlements with Geoksyur I being the largest (the Soviets characterize it as a "capital" town in Namazga III times), the increase in metal objects and increasing efficiency of irrigation systems (Lisitsina 1965), all attest to a transformation of increasing cultural complexity characteristic of an indigenous primary urbanization. In addition, Soviet archaeologists excavating Kara Depe point out important qualitative changes characteristic of the Namazga III period. Houses become multichambered units, each with a distinctive courtyard; a characteristic difference from the earlier typical one-room house. The excavators see in this an important social shift from the nuclear family to accommodations of extended family groups united by kinship and economic ties within a more integrated and centralized community. By the late third millennium (Namazga V) southern Turkmenia achieves a fully urban status as evidenced by the excavations at Altin Depe, with its large "ziggurat" and other structures necessitating corporate labor and indicative of administrative functions (Masson 1967, 1968).

One may now ask if following the initial phases of primary urbanization in South Turkmenia there was an attempt at expansive colonization and the acculturation of distant cultures, as characterized by early Sumer and Elam. Was there, in other words, a structural similarity in the process of urbanization in this area? I turn to two sites to suggest a qualified "yes." Excavations at Mundigak and Shahr-i Sokhta both suggest a primary incorporation by the Namazga III-IV cultural complex. Tosi (Lamberg-Karlovsky and Tosi 1973) has argued that in the initial settlement of Shahr-i Sokhta, 40 percent of the total material, including painted pottery, was derived from the South Turkmenian sites. In fact, he argues for a direct colonization of Seistan and the delta of the Helmand from South Turkmenia bringing about the initial settlement of Shahr-i Sokhta. Similarly, in Mundigak III and IV there are substantial parallels in material culture which tie the site closely to those of South

Turkmenia. The archaeological evidence strongly suggests a primary incorporation by direct colonization from South Turkmenia to Shahr-i Sokhta. The presence of identical ceramic types and metal compartmented seals at such sites as Damb Sadaat II-III (Namazga III-IV), Said Qala Tepe, and Gumla II on the Indus Plain, are suggestive of a secondary involvement in the acculturative process in these areas of indigenous culture with those of the primary urban centers of southern Turkmenia.

The reasons for this expansive colonization to Shahr-i Sokhta and the increasing interaction with the indigenous cultures of the Indo-Iranian borderlands is as imperfectly understood as that which brought about the same process in Sumer and Elam. One explanation, which is an imperfect one for the understanding of its entirety within the Indo-Iranian borderlands, rests upon the total abandonment of the settlements of the Tedzen Delta during the last phases of Namazga III and their suggested southern migration to Seistan and Shahr-i Sokhta. The causes for the abandonment of these settlements has been argued as resulting from the changing of the courses of the hydrological system of the Tedzen Delta caused by the silting up of the channels and neotectonic phenomena. It is hard to accept, however, that such a localized phenomenon within South Turkmenia would have accounted for the primary incorporation and secondary involvement of so many sites in the Indo-Iranian borderlands.

The evidence for direct colonization of, for example Habuba Kabira by the Sumerians or Tepe Yahya by the proto-Elamites, remains far more convincing than that of Shahr-i Sokhta by the Namazga III/ Geoksyurian cultural complex (Turanian). Nevertheless, the evidence suggests that the initial process of urbanization in each area was followed by an expansive interaction and/or colonization of "foreign" indigenous cultures. One may fairly ask, prior to investigating the Indus area, whether one can observe a structural similarity in what happened on the different sites following colonization? The answer would appear to be an unequivocal "yes." The sites "colonized" (Yahya, Sialk, Shahr-i Sokhta, Habuba Kabira, *et al.*) in *all* regions were without exception abandoned by the colonists with the communities reverting to their indigenous culture. It would appear that after a century or two at the most, colonization ceased to be carried out and the areas colonized were abandoned. The cause of the withdrawal from the colonies remains elusive though it has been suggested for at least one instance that "the administrative costs, and expenditure incurred, assuring safe transport of goods and personnel, were higher than the economic return gained from the 'colonies' " (Lamberg-Karlovsky 1978: 119).

I might add that this bureaucratic collapse in maintaining the colonies might be "turned on its head" to provide an explanation for the initial colonizing. Explanations have favored the establishment of colonies to control local resources. As an alternative I suggest that the developing state experienced an expansive growth of a bureaucracy. That is, the growth of a managerial class which can readily expand and/or be adopted beyond the limits of its own territorial development. It is not impossible that in these cases a bureaucratic structure, as a self-contained entity, expanded beyond its own territorial limits and was imposed and/or adopted in "foreign" areas. The explosive growth of this managerial bureaucracy had within it the seeds of its own destruction. Its rapid development, within a century or two, ultimately led to its collapse, for it had overextended its own ability to maintain the costs of its existence beyond the frontiers of its creations.

To what extent are the structural similarities of processes involving primary urbanization, primary incorporation, and secondary involvement noted for Sumer, Elam and Turan similar and/or dissimilar to the situation of the Indus Civilization?

Our first important consideration deals with comparative chronology. In the cases of Sumer and Elam the processes contrasted above deal with the time from Late Uruk to Early Dynastic I, that is approximately 3200-2900 B.C. The Namazga III-Geoksyurian complex (Turanian) refers to a period at about 3000-2700 B.C.; thus overlapping only the later part of the Sumerian-Elamite process. For aspects of primary urbanization within the area of the Indus the dates are again slightly later: 2800-2500 B.C. Thus, as a general observation, it appears that as one moves from west to east the process of urbanization occurs at a *slightly later* date. This phenomenon has in the past been interpreted as resulting from the diffusion of urban traits from the west to the east. Such a process is explicitly stated in Sir Mortimer Wheeler's famous phrase in considering the rise of the Indus Civilization (Wheeler 1968: 135).

> But it can at least be averred that, however translated, the *idea* of civilization came to the Indus

> from the Euphrates and Tigris, and gave the Harappans their initial direction, or at least informed their purpose.

The west to east sloping chronology remains today the strongest, and perhaps only, logic for maintaining this diffusionary conception. Most archaeologists would argue for an essentially independent process of primary urbanization in the Indus area, while not denying that external contact took place (for a recent review, see Gupta 1979).

Recently Dr. Rafique Mughal (1973: 15) has suggested:

> Thus, before the rise of large cities of the Indus Civilization, a wide-spread cultural phenomenon had already set a permanent and uniform pattern of essential elements.

This "uniform pattern of essential elements" Mughal (1970) termed the "Early Harappan" and incorporated sites such as Harappa, Kot Diji, Gumla, Kalibangan, Amri, Sarai Khola, Jalilpur, etc. This Early Harappan remains chronologically poorly defined, being dated by only a few ^{14}C dates, all of which would confirm an early third millennium date for its inception. Such a date suggests that the process of primary urbanization in this area was roughly contemporaneous with the Namazga III/Geoksyurian Complex and only a few centuries later than that of Sumer and Elam.

To what extent following primary urbanization can one document, as in Sumer, Elam, and Central Asia, the replicating process of "primary incorporation by colonization" and sites of "secondary involvement?" In both cases one can answer in the affirmative. The recent discovery of Indus sites in the vicinity of Shortugai near the Oxus River represents not only the furthest northern expansion of the Mature Indus Civilization but a clear colonization of that indigenous area (Francfort and Pottier 1978). The excavators of the sites have suggested that the colonization of these northern settlements was brought about by the desire of the Indus Civilization to exploit resources (copper) and control the trade of lapis lazuli. Additionally it can be pointed out that several of the Early Harappan sites were reoccupied (colonized?) by the Mature Indus Civilization. Thus, the direct stratigraphic superposition of Mature Indus occupations over the local indigenous cultures at Kalibangan, Kot Diji, Amri, Bala Kot, etc., indicate that following primary urbanization (the Early Harappan) these sites were directly incorporated into the cultural system of the Indus Civilization.

Evidence for "secondary involvement" with the Indus Civilization can be documented through the presence of undoubted Indus material remains in areas beyond its direct geographical expanse. Thus, the discovery of Indus seals, one with an inscription, at Altin Depe in Central Asia (Masson 1977) or the presence of an Indus inscription impressed on a sherd from Tepe Yahya (Lamberg-Karlovsky 1978) are rare, even unique finds, but indicate a distant communication with these areas. There is little evidence, however, to suggest that these isolated finds, helpful only in establishing a time-space framework, indicate important social, political or economic communication with these areas.

The question of Mesopotamian-Indus relations has long been a topic of concern. The total absence of clear Mesopotamian materials in the Indus is in ready contrast to the presence of numerous Indus seals on many sites in Mesopotamia. Should the equation of the place name Meluhha, mentioned in Mesopotamian texts, be the Indus Civilization then the recent argument for the acculturation of Harappan peoples in Mesopotamia obtains firmer ground (Parpola, Parpola and Brunswig 1977: 129–65). Adequate methods, from strictly archaeological material remains, for deriving the extent and nature of acculturation still remain to be worked out. One may suggest, however, one instance in which archaeological evidence may be suggestive of acculturation. Seals in the Indus are almost exclusively square while those of Mesopotamia are cylindrical. Their distinctive form and style have long been recognized and allow for easy identification. Two "Indus" seals from Mesopotamia suggest an acculturation of form and style with Mesopotamian products. A glazed steatite *cylinder* seal from Tell Asmar depicting an elephant, rhinoceros, and crocodile (*gharial*) is well known for its Indus style (Frankfort 1939: 50, Fig. 32). Only three cylinder seals are reported by Mackay (1935: 192, Pl. M: 10, 11) as being recovered from Mohenjodaro, compared to the over 300 square seals. The cylindrical form of the Tell Asmar seal with the classical Indus motif is, with one from Ur, unique. Additionally, one can point out that the convention by which the elephants feet are rendered and the network of lines extending over the body, head and trunk (normally restricted on Indus seals to the ears) is without parallel on Indus seals. I would suggest this: the Mesopotamian seal *form* (cylindrical), with aberrant Indus *style*, is not an imported Indus object (as suggested by Frankfort 1939: 305) but a product made in Mesopotamia by a local craftsman under instructions from a Harappan. The end product was a cylinder seal incorporating the basics of Indus style but neither the artisan (Mesopotamian) nor client (Harappan) got the seal quite right—the compromise of acculturation. The only other example, the cylindrical seal from Ur, shows a Brahmi bull at its manger, a second unidentifiable creature, a tree motif, and a scorpion. Scorpions never appear on Indus seals; but they are most definitely a very common motif on those from Mesopotamia. Again, I would suggest this to be a product of direct acculturation—much as one might argue in an another direction for the bearded bull depicted on a fragmentary silver vessel from the Fullol Hoard, in Afghanistan, being a distinctive Mesopotamian motif adopted on the silver vessels from Fullol (Tosi and Wardak 1972). Such evidence of iconographic adaptation of foreign symbolism suggests a more direct communication of ideas than the isolated finds of objects of Indus manufacture at Altin Depe or Tepe Yahya.

CONCLUSIONS

This paper is necessarily an abstract, a preliminary study, encompassing a large geographical area within one of the most complex archaeological regions of the Old World. I have attempted to point out, without full documentation, that there were important structural similarities in the urban processes which characterized Sumer, Elam, Turan, and the Indus. Most important among these are:

1) Areas of primary urbanization were characterized by considerable ethnic diversity. The archaeological evidence supports clear cultural distinctions between North and South Mesopotamia, Sumer and Elam, North Baluchistan and the Indus, Turan and the Hilmand Civilization, etc. Each of these regions of primary urbanization, far from indicating a cultural homogeneity, are characterized by inter- and intra-regional differences, highly suggestive of ethnic diversity (clearly indicated for Sumer where texts are available).

2) Within each of the areas of primary urbanization, and perhaps resultant from the ethnic diversity which characterized them, there is substantial evidence for conflict and warfare. Clearest evidence for this comes from Egypt (ca. 3000 B.C.) and Sumer-Elam (ca. 2800 B.C.) where texts indicate the enmity and warfare which characterized the period of primary urbanization and political centralization in these areas. The first fortification systems constructed around such Early Harappan sites as Kalibangan, Kot Diji, Rahman Dheri, etc., further indicate conflict conditions at this time within this area.

3) Following the period of primary urbanization, distantly inhabited regions were colonized. This represents the primary incorporation of these regions into the urban economic and political spheres of influence. Typically, the establishment of these colonies, and the increasing interregional interaction, has been understood in terms of a desire for resource control; the need to control particular resources, particularly of an elite nature, to validate the status distinctions within the emerging urban centers. Without taking exception to this view, I can point out that the increasing tendency toward political centralization and conflict resolution led to the growth of managerial bureaucracy. The formal structuring of this bureaucracy may also have facilitated methods of conflict resolution. The increasing formalization of a bureaucratic structure at a time of increasing levels of decision making, may have in its own right been exported and adopted in distant areas as a valued good. This suggests that institutional structures, within any social order, can be exported and adopted as a commodity.

4) Without exception the "colonies" indicative of primary incorporation and the intensification of interregional contacts that they represent, "collapse." That is to say, after 100-200 years they abandon the region. The understanding of this phenomenon is elusive. Perhaps the managerial bureaucracy which made it initially possible had overextended itself and the "costs" of their maintenance exceeded "profits." Perhaps internal tensions within the region of each primary urban center regained stronger internal integration after a period of rapid growth requiring abandonment of their "colonies." Perhaps, the "foreign" areas, for different reasons, expelled the colony in favor of earlier managerial systems. What is evident, however, is that during the period of colonization the indigenous culture became secondarily involved with the colony. This secondary involvement can be seen in the single finds of "foreign" materials in distant places, i.e., Indus stamp seals at Altin Depe, following colonization at Shortugai.

5) The common process following urbanization

in Mesopotamia, Elam, the Indus, and perhaps Turan involved the establishment of colonies in distant regions with an increase in regional interaction. There was then an abandonment of the colonies and a collapse of the interregional integration. Thus, structural similarities are evident and they suggest a common process. The explanation for that process is now a fundamental problem to be resolved.

6) Much of this paper concerns center-periphery relations and the observation that within the centers of Sumer, Elam, Turan, and the Indus there was an expansion to the indigenous peripheral cultures. This expansion was characterized by direct colonization of the peripheral cultures by populations from the centers of more advanced civilization. It can be hypothesized that the impingement of the centers on the periphery results from multiple and interacting factors: (1) the desire of the center for the control of the flow of resources; (2) rulers of the centers attempting to prevent the tendencies of the periphery to coalesce into broader centralized political frameworks; (3) expansive tendencies among the elite of centers to structure hierarchies in the periphery; (4) the arrangement of status sets (the development of symbols of common political and cultural entity) to expand the essentially political aspects over the periphery in maintaining the centers normative definition of the political, economic, and social institutions; and (5) to allow for the custodianship of principle kin groups from the centers of expansion of their "cosmic" order—the moral and social order.

The results of such colonization, the permeation of the peripheries by centers results in an acculturative process involving: (1) forms of administration by laws derived from the centers; (2) regulatory aspects in maintaining peace; (3) exaction of taxes; and (4) maintenance of cultural and/or religious links, effected by increasing kinship ties.

NOTE

[1] These processes have been discussed by a number of authors such as Oats and Oats (1976), Oats (1978), Postgate (1977), Adams (1966), Redman (1979), Wright and Johnson (1975) and Lamberg-Karlovsky (1978).

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K.V. SOUNDARA RAJAN

5. Motivations for Early Indian Urbanization: An Examination

It is common knowledge that the establishment of urban settlements in India, as elsewhere, followed a riparian pattern wherein major river valleys were colonized first. The Indo-Gangetic Plain has been occupied by several cultures of which the Indus Civilization poses to be the oldest and parent model for urban life and material prosperity. Urbanization, it is needless to add, was not a preconceived or universalized scheme, but an exclusive, original process, decided as much by antecedent conditions as by ecological compulsions. At the time of the rise of the Harappan Civilization, in the Indus Valley, a large part of the rest of India was passing through discrete stages of a pastoral neolithism, often coeval with one or the other facets of the Indus Culture. Urbanization did not reach the Ganges system, however, much prior to the end of the second millennium B.C.

The oldest literary heritage of our land gives the pride of place to the authors of the Vedic hymns who had established themselves in parts of the Punjab and Haryana. When the process of their expansion, acculturation and gradual urbanization had run its course from their *quondam* pastoral life, one finds the residents of the northern plains in the *entire* Ganges Valley were heirs to a rich heritage of a Vedic-Brahmanical, epic-historic, religio-cultural synthesis. Between *Brahmavarta* and *Aryavarta,* thus, was witnessed a spatial, sociocultural shift and metamorphosis.

In this context, trade, religion and art became the main preoccupations of the people, given a fairly stable and efficient polity which, though, was carrying the germs of a truly monarchical system. The earlier systems of society had no such polity but were a coordination of vocational skills in the civic centers; however the primarily agricultural pattern in the villages was uncoordinated in comparison. Leadership of the civic or rural communities was not crystallized into a particular coterie or tribe. In fact, even the republican states *(Mahajanapadas),* which became increasingly important during the period of the first colonization of the Ganges Valley, do not seem to have had: (a) hereditary claim to social office, (b) socially fixed, rigid status, (c) firmly defined territorial jurisdiction[1]—the first among the several traits of a monarchical system. There was neither a conscious trend toward "expansionism" nor any superior socio-economic viability characterizing their spread. It might even be appropriate to concede that a hereditary monarchical system was a sequel to the consolidation of the Vedic culture. This was a "nationalization," at the hands of the Vedic sages and schools, of the prevalent planned, temporal programs of the urban centers, into whose mold was squeezed a new flow of organized spiritualism which the former lacked. This may explain why the Chalcolithic Cultures of the post-Indus Valley period were disparate in character, being the mutations of the indigenous, chthonic groups in which neither *culture* nor *cult* played any special part which could impart a self-generative momentum to the society. On the other hand, the early Iron Age urban cultures of the Ganges Valley were able to form an integration of religious, economic and political institutions. Unlike the Indus Civilization or the Chalcolithic settlements, the early Iron Age habitations had a *polity,* expressed in terms of geographical jurisdiction, internal cohesion, defensive and offensive works and a systematized religious orientation (by either the king or an elite) of which the last (namely, religion) was *different* from the diversified nature of the cults of the people.

Thus, one may be tempted to state that the urban trends evinced by the Harappan Civilization were a face lift, a window dressing and a draconian insistence on a regimented pattern. It seemingly did not have its firm roots in an urban matrix, nor did it seem to have any clear liaison between the ruling elite and the rural folk, between the civic overlords and the peasant proprietors of the villages. It was something like a stringent, centralized oligarchy, which had invented a disciplined civic model, with a consumer policy for drawing the agricultural surplus of the villages. Thus, the so-called standardization of the structures, pottery and antiquities of the Harappan Culture may be essentially an index of the *vogues* created by the craft guilds of the city-states.

Taking a parallel analog in the early historic trade modes in Southern India, it can be seen that the southern guilds dealt with virtually every commodity produced in the countryside, pooled them, vended them within and even outside India. The surplus of this trade-built capital they used as munificent religious donations for Jainism, Buddhism and other religions. They even advertised their philanthropy through inscribed records. Similarly, even the Harappan villages were the deliberate products of a consumer-oriented regulation. Their cultural trappings were a mere urban veneer. That which went by the appellation of "Pre-Harappan," whether at Kot Diji, Kalibangan or Amri, was a similar series, though more discrete and less systematized than the Harappan, of craft production, including pottery for daily life. Thus these antecendent Harappan stages were "Pre-Harappan" in a strictly cultural sense, in addition to the temporal sense. Trade and civic organizations were what was missing in them. Since the bulk of the trade transactions of the Harappans went toward catering to, and underwriting the coeval village economy and nexus, when the trade balance eventually broke down, everything broke down. Economic disintegration thus, was one of the vital reasons for the disappearance of what could be termed as the "high life style" of the Harappan Culture seen in its period of primacy between 2600 B.C. and 1900 B.C.

The existence of people contemporary with the Indus Civilization in its mature stages in Gujarat, Central India and the Deccan has become increasingly clear with recent archaeological research. The continuance of the Late Stone Age microlithic or stone-using cultures well into the Chalcolithic and later even into the tribal stages (despite the advent of urbanization) represents a clear process of *recession*. Cultural expansion, after the rootless *melange* of Post-Harappan Cultures, into consistent urbanization and growth, is seen most diffused only from the secondary stage (of Iron Age) in the Ganges Valley. The sites reflecting the Post-Harappan *milieu* are the largest in this region, smaller in the Punjab and smaller yet in the Deccan. Rajasthan, Gujarat and Central India did have the development of iron technology but these regions did not seem to have reached an urban balance, socioculturally speaking. Based on the above, the problems are: (1) Did the Chalcolithic stage of the protohistoric cultures in India vitally contribute to the advancement of the society as a whole, toward eventual urbanization (in the stage antecedent to their Chalcolithic acculturation)? (2) Did the Indus Culture bequeath its seemingly systematized urban traits to the Chalcolithic and the Iron Age urbanization? (3) Which were the epicenters of the ecological and social motivations which distinguished indigenous developments and intrusive patterns during the third and second millennia B.C. in northern as well as southern India?

It has been variously held that urban growth in India was a product or concomittant of: (1) the consolidation of political power, (2) economic or money power, or (3) that no truly urban cities existed, the vast population was rural and only drifts toward town life occurred. The first view seemingly ignores the fact that there could be cities without regular urbanization. The second point ignores the fact that trade does not spend or invest its surplus *only* in cities, but everywhere. The city was not absolutely necessary for the prosperity of trade either. As regards the last point, it may be stated that cities have existed at all times, on a sociocultural basis, where consumer goods were in demand and where "white collar" jobs, to take a modern term, alone existed. But it should indeed be asked if a city is essentially a political center? A pilgrim city of today, like Kasi, is an exception to this idea. Is it an economic center, for trade alone? There are several conventional market cities or towns which are exceptions to this. Is the city an artificial place where some floating, drift population gathers and diversifies its wants? The answer seems to be that the base of a city is:

1) its topographical advantage;

2) high consumer potential;

3) unquestioned cultural, religious or spiritual sanctity; and

4) where civic control is, even otherwise, well established; which is self-governing and therefore not directly linked with a ruler or a political power center.

The cumulative results of the above could make a city mainly a trade center, with (a) civic, (b) exchange, (c) consumer, and (d) cultural functions. It is likely that after each city was formed, political power shifted into the one most strategically placed. In early historic context, around the sixth century B.C and after, the city was first a secular and temporal civic center. It is fortified only in the subsequent stage, thus becoming a political and military center. As a sequel to this development, unregimented civic amenities and free life are lost in such centers. But they do shift to towns and villages, where greater freedom exists due to the absence of metropolitan compulsions. Fortified cities can be identified with power centers, but secular and temporal graces can be witnessed only in towns and villages. In a subsequent stage, the fortified city itself is superseded by, and modified into, larger metropolitan and suburban complexes which draw from the villages and thereby seek to revitalize trade. Considered in this light, urbanization is the capacity for the widest habitational spectrum, with cultural differentiation. It is the capacity to promote thought, art and leisure activities and artisans like musicians, painters, perfumers, entertainers, sportsmen and caterers. None of these is politically motivated and they can exist only under the shadow of economic affluence, created either from the surplus of agricultural produce from rural areas or by trade surplus from inter-city or other exchange processes. Mere political or military power centers have never become cities with urban flowering. They develop into cantonments.

In the Harappan context, the city was concomittantly the center of politico-religious power. The Pre-Harappan stage was devoid of this dichotomy of political cum civic center between the city consumer and the suburban retailer.

The implications of a fortification in a town, especially in the earliest Harappan context, are seemingly different from those of the second (Iron Age) urbanization. It is to be noted that the twin mounds of the Harappan sites, with separate fortified enclosures, and the later Iron Age fort-cities, should be basically different. The close liaison implied in the latter, with the citadel located *within* the city-fort, is not seen in the Harappan case. Hence, there is a likelihood that there was an absence of regular civic or community administration of the people—only their management and control for the benefit of the "citadel" people.

Hence, to recapitulate, Pre-Harappan Culture was not urban. The Harappan Culture was an urban dichotomy with political control and civic consumer potential as its highlights. The Post-Harappan lapsed into a degenerate consumer situation, with village-type community status and was otherwise much like the Pre-Harappan. The clock had come a full circle.

In the second stage of urbanization, the city outside the citadel was painstakingly built by tradesmen as a civic center, with cultural amenities, topographical advantages and spiritual sidelights. In fact, *srenis* might have been directly in charge of these civic centers. Then, with increasing political might, they were taken over by political overlords.

Trade was not under the capricious leadership of the state—autonomy was clearly accepted. It is this that gave rise to the well-known series of autonomous trade guilds. These served as a bridge between the chieftain and the people and helped in the decentralization of the fiscal and revenue programs of the state. It is not yet clear if the role of the trader in the Harappan Civilization was comparable. The overwhelming importance of trade, however, is fairly obvious and there might have been a very close relationship between the chief of the city-state and the trading agency. One is not yet in a position to partition from material finds the secular, mercantile and religious segments of the Harappan civic organism. As and when one finds the means of achieving this, one will be nearer an understanding of the actual urban "model" it represents. It has recently been argued, mainly it would seem to avoid placing Harappan town planning into a rigid mold, that the Indus town pattern was not identical everywhere, as at Mohenjodaro, Harappa, Lothal, Surkotada, etc. This view may be laudable enough as a desire to investigate the background of how and why the Harappan civic plan developed. But it is obvious that the Harappan city pattern was, as already shown, different from both the early historic town planning, and the proto- or Pre-Harappan pattern (e.g., Kot

Diji or Kalibangan or elsewhere). There is no need either to consider all the cities as representing one pattern. There were undoubted metropolises like Mohenjodaro, Harappa and Kalibangan, port towns like Lothal and Rangpur, and trade outposts along coasts. Other settlements were in comparatively less inhabited areas, as at Desalpur, Surkotada and Sutkagendor. This is why the pattern differs. Similarity was in the "trade objective" that united them. It has recently been argued that models for these cities can be found in the upper Sarasvati Basin (present Bahawalpur region) in Pre-Harappan times. But there is no evidence available for trade or economic viability of these places during the Pre-Harappan. It would perhaps be fair, to a limited degree, to postulate that, in the final analysis, the origins of Harappan cities should be explored in the immediate region in which the cities themselves developed. But the full explanation of the city organization and layout will come from an understanding of the cumulative impact of several factors, economic, political, cultural, etc.; and West Asia need not in entirety be a region out of bounds for influencing such a phenomenon.

Here again, it is worthwhile examining another analog: the earliest "megalithic" tomb type(s) of India, which are mainly, to be seen in the lower Deccan. The inspiration for these doubtless came to India from the West Asian and Mediterranean regions, through obvious agencies of trade. But, the first megalith type is not known in India since there is a minimum chronological gap of at least half a millennium between the later series of megaliths of the West and the earliest in India. The latter can be placed toward the end of the first quarter of the first millennium B.C., or a little earlier. Nor were the models for Indian megaliths just imitations of a *single* western archetype. The reason for this is that there must be an equation between the model and the contemporary sociocultural base of the adopting region. This equation varies across time and space. Returning to Harappan urbanization, the Indus model was intended to be a trade-oriented urban standardization. This did not exist in the antecedent (Pre-Harappan) stage but developed in the Harappan age due to several visible and invisible factors, as clearly held by Wheeler. In trade-supported city centers (like, for example, Singapore or Hongkong, on a modern analogy), there is always an elite way of life in the upper strata of the community. A rural, or less-consumer based, sector of people will also exist in a substandard urban condition, but these people will always be controlled by the elites. There is no class or caste difference here, there is no religious superiority, there is no antecedent base for it. It is consumerism that separates the upper class from the lower, bestowing the leadership for organization, in the hands of the higher rank, and making it also tend thereby to control the masses. Religious groups may have been trying to strengthen the hand of the elites, by their own exclusive character, but they have no pervasive influence—on either the controlling elite or on the masses. The folk cults of the masses, on the other hand, continue to reign, more as a concession from the upper (technocratic) stratum to the lower (agricultural) groups. In due course, they get into one or more firm religious preferences, on the basis of the transformation or absorption of folk cults by the elite groups, grafting them into their own religion's beliefs and creating a "vogue" for them. There was no institutionalized or well-organized religion, as such, in the Harappan cities of India. The terracottas, etc., do show the germ of a cult but these belong to the folk order. To that extent the Harappan city-state was indeed secular. The religious trend, it would seem, reached these cities, in a significant way, at about the beginning of the second millennium B.C., and, growing in momentum, upset the Harappan secular, urban, consumer-oriented agriculture-exploiting economy by the middle of that millennium. This led to its decay and the rise of new masters in the form of a new religious and an intellectual elite. One is not able to see and touch them yet by using archaeological tools; although their presence is felt in the Ganges Valley during the succeeding centuries in specific institutions and the compartmentalization of social participation witnessed in no uncertain terms, and inspired in this regard, by a firmly and categorically postulated ethicomoral manual—the *Smriti* code—as its cohorts. The socialization process of urbanization was consummated here; whatever be its own repercussions on society in the subsequent stage—that is, the age of the protestant creeds of Mahavira and Gautama.

Please see the Appendix attached to this paper for a summary of the issues discussed here.

SUMMARY

Harappan Urbanization

This was probably a conditioned, secular, consumer-oriented, agricultural-exchange economy—a stringently disciplined oligarchy of political, trade and technocrat coterie. Its Pre-Harappan stages themselves did not have the germs of this conditioned urbanization system. Its motivations, thus, though perhaps caused by special leadership traits, may have been inspired though not fashioned on contemporary external centers of civilization.

On the other hand, the Iron Age urbanization had its motivations caused by certain non-Harappan trends and forces which had prevailed in India in the second-first millennium B.C. which stimulated both the head and the heart, and had a universalized social purpose. They thus promoted a polity, art, thought and national or sovereignty concepts, for the first time, on a pan-Indian basis, with the State liaising with trade groups as well as citizens.

APPENDIX

Comparative aetiology of Harappan and Iron Age urbanization differentiae

Harappan urbanization	Iron Age urbanization	
	Early	Late
1	2	3
Citadel and city separately walled	Citadel and city unified	Improved unification
Trade independent of civic leadership (?)—largely maritime and external	Trade independent of political control and both inland and maritime	State trade and tax for revenue
Civic leadership combining spiritual role also	Republican/monarchical leadership hardening into dynastic rule with religious aura	Dynastic king—God rule
Civic standardization of structures—brick size systematized—sanitation	Fort palace—civic center concept—brick sizes vary—no centralized sanitation	Extreme variation in construction—minimal civic sanitation
Uniform pottery types by centralized technical control of vogue and production	Marked variation and proliferation of pottery forms and types—*deluxe* wares registering economic disparities with localized private kiln production	Varied qualities and mass production of local wares imported techniques and local imitation
Organized religion only marginally apparent	Evolving and vibrant religion assimilated by society—institutionalized by law codes (?)	State preoccupied with religion and a social obsession with cults
Craft resources pooled and crafts processed by the city-state into standard patterns	Craft resources and process a private enterprise but under caste groups concerned	Craft resources state-owned or controlled but workmanship in caste groups
No standing army or war machinery or defense works in city layout	Defense part of social structure under king and his army, wars a regular phenomenon	Defense-like kingship on regional basis and advanced defense tactics and machinery available

(*Contd.*)

1	2	3
Writing limited, exclusive non-alphabetical and not a social tool	Literacy on oral tradition but germs of regular writing noticeable	Extensive alphabetical public and private written records
Weights and probably measures of a graded range occur but no coinage, as barter system alone prevailed in the agricultural exchange economy that prevailed. No stable self-sustaining monetary system existed. Gold used only for ornaments	Weights and measures as well as coinage prevailed in gold and silver standard in some form. This further reflects a regular buyer and seller economy based on a monetary system which could, by its state control produce rich and poor classes	A more stable but a more centrifugal and fluctuating economy, divided into several autonomous regional systems each under a powerful political leader or king
Religious statuary in stone almost non-existent but effigies in terracotta in limited quantities occur, was it folk- (?) or fetish-based (?) and not reflecting communal religion though produced for some spiritual trends. Metal statuary, minimal and probably secular	Profuse stone, metal and terracotta figurines suggesting religious groups in society of ununified character. Mostly folk but with unseen influences from sacerdotal religions	Religious art well consolidated mostly under state patronage of temples side by side with eschatological and secular trends
No private property seemingly existed except perhaps in villages, of land use but open to demand of produce and animals for exchange—trade by city-states	Private property implied and inferred by socio-religious codes, of both movable and immovable categories. Transport system expanded and regulated for military and civil needs	Highly competitive social class and caste disparities with professional occupation on caste basis decentralized to village levels but under monolithic state control

NOTE

[1] The *Ayudhajivis* mentioned in the *vartika* of *Ashtadhyayi* of Panini (and applicable later to the *Malava* and the *Yaudhaya ganas*) involved groups not claiming any administrative apparatus but mainly of peripatetic mercenary status.

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PART II

RESULTS OF RECENT FIELDWORK

JEAN-FRANCOIS JARRIGE

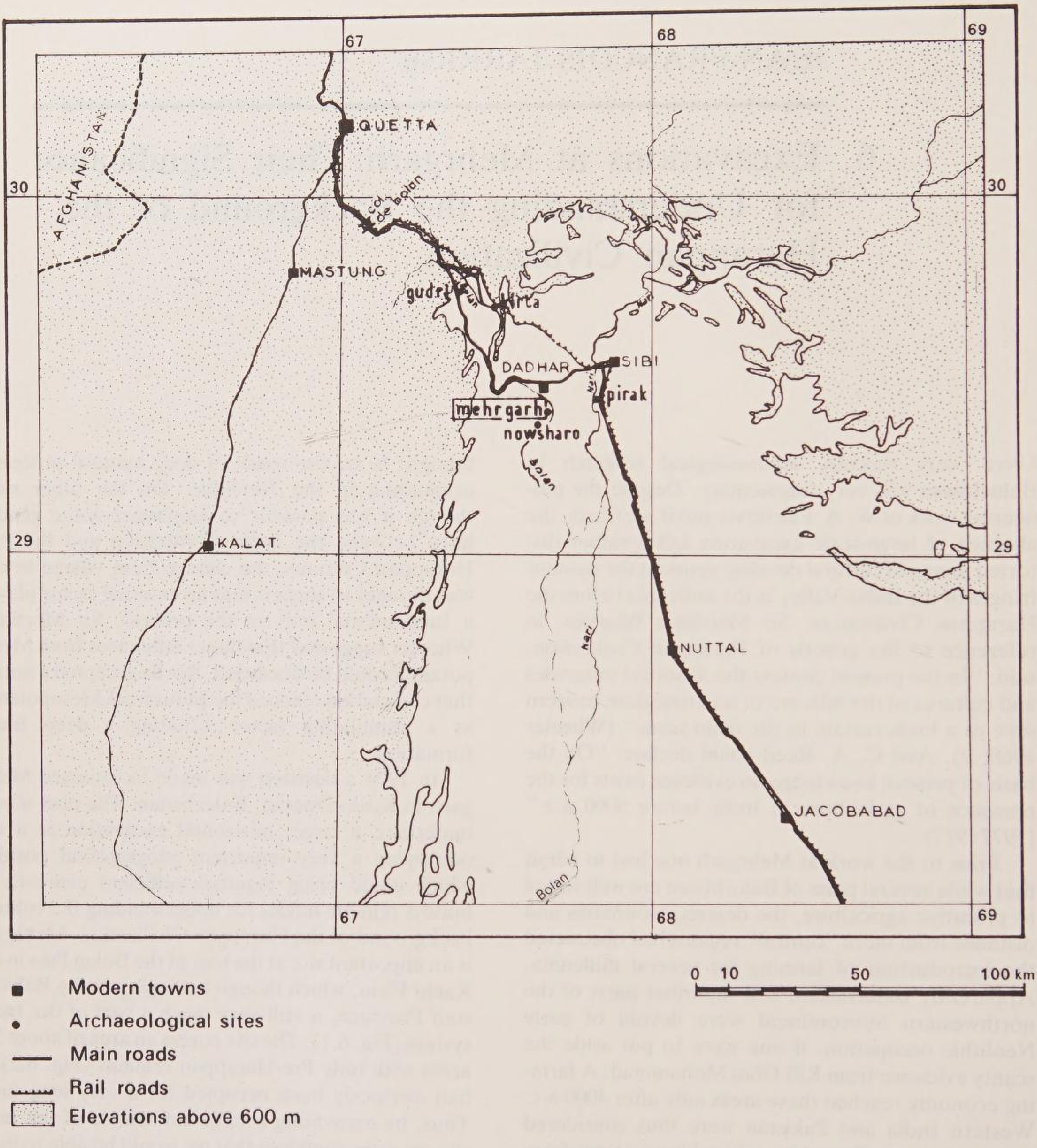
6. Excavations at Mehrgarh: Their Significance for Understanding the Background of the Harappan Civilization

UNTIL very recently archaeological research in Baluchistan was very fragmentary. Despite the pioneering work of W. A. Fairservis and B. de Cardi, the absence of large-scale excavation left a rather distorted image of cultural developments on the western fringes of the Indus Valley in the millennia before the Harappan Civilization. Sir Mortimer Wheeler, in reference to the genesis of Harappan Civilization, said: "In the present context the ill-sorted industries and cultures of the hills are of no immediate concern save as a back-curtain to the main scene" (Wheeler 1968: 9). And C. A. Reed could declare: "On the basis of present knowledge no evidence exists for the presence of agriculture in India before 5000 B. P." (1977: 917).

Prior to the work at Mehrgarh one had to admit that while several parts of Baluchistan are well suited to primitive agriculture, the deserts, mountains and distance from more "central" regions had obstructed the introduction of farming for several millennia. Apparently Baluchistan, and the other parts of the northwestern Subcontinent were devoid of early Neolithic occupation, if one were to put aside the scanty evidence from Kili Ghul Mohammad. A farming economy reached these areas only after 4000 B. C. Western India and Pakistan were thus considered marginal areas affected by cultural innovations from Western and Central Asia only via diffusion. There was apparently a fundamental contrast between the two main civilizations of Ancient Asia. On the one side, urban growth in Mesopotamia and Susiana was thought to be the result of deep cultural processes originating in the Neolithic. On the other side, though it was possible to emphasize some genetic links between the Indus Civilization and the Pre-Harappan Cultures, the change from village to city was thought to suggest that an external factor played a fundamental part in the process. Sir Mortimer Wheeler suggested that direct influences from Mesopotamia could be discarded. But he accepted a notion that civilization reached the Indus from Mesopotamia as a stimulating factor initiating a deep transformation.

In 1974 a decision was made to excavate Mehrgarh in Kachi District, Baluchistan. The plan was to undertake a large, horizontal excavation at a site occupying a very important geographical position which could bring together sufficient elements to build a reliable model for understanding the cultural background of the Harappan Civilization. Mehrgarh is an important site at the foot of the Bolan Pass in the Kachi Plain, which though belonging to the Baluchistan Province, is still very much a part of the Indus system (Fig. 6.1). The site covers an area of about 500 acres with only Pre-Harappan remains (Fig. 6.2). It had obviously been occupied for a very long time. Thus, by excavating a sufficient sample of this huge site we were confident that we would be able to build a solid chronological framework with deep significance for understanding the socioeconomic background of the Harappan Civilization.

After five excavation campaigns at Mehrgarh we


67
68
69
30
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AFGHANISTAN
QUETTA
col de bolan
MASTUNG
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kirta
Nari
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SIBI
pirak
mehrgarh
nowsharo
Bolan
KALAT
Nari
NUTTAL
JACOBABAD
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0 10 50 100 km
Modern towns
Archaeological sites
Main roads
Rail roads
Elevations above 600 m

Fig. 6.1. Map of the Kachi Plain.

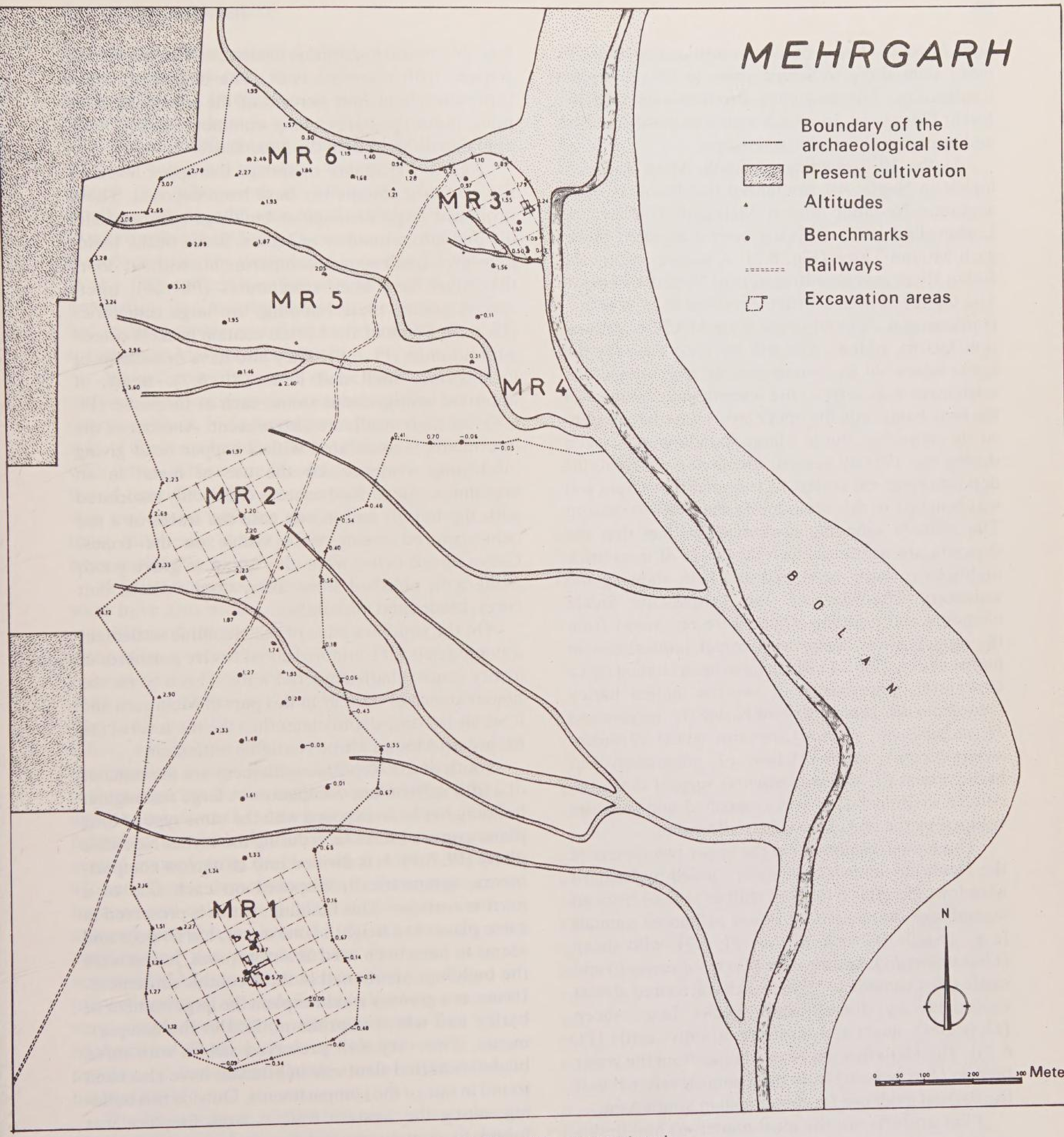
MEHRGARH
Boundary of the archaeological site
Present cultivation
Altitudes
Benchmarks
Railways
Excavation areas
MR 6
MR 3
MR 5
MR 4
MR 2
MR 1
BOLAN
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Fig. 6.2. Map of the site of Mehrgarh.

now have evidence of continuous occupation for more than three millennia prior to the Harappan Civilization. The sequence demonstrates that the Kachi Plain is an area with a long cultural tradition and its own regional characteristics.

At the 1977 meeting of South Asian Archaeologists in Naples we announced the discovery of an aceramic Neolithic site at Mehrgarh (Jarrige and Lechevallier 1979). This has been designated Mehrgarh Mound Three (Fig. 6.2). A section cut by the Bolan River revealed 10 meters of Neolithic deposit. The top levels of this settlement dated to ca. 5000 B.C. (radiocarbon determination with MASCA calibration factors added). We still have no date for the lower layers but we assume that the beginning of the settlement is as early as the seventh millennium. For the time being only the upper layers have been extensively excavated, but in a large sounding undertaken during the 1978-79 season, five meters of Neolithic deposits were excavated. It is hoped that virgin soil was reached in this area during the 1979-80 season. The 1978-79 sounding confirmed the fact that the deposits are aceramic. Several layers of mud-brick architecture have been exposed here showing the sedentary character of the settlement. Sickle elements and grinding stones were recovered from the upper levels along with cereal impressions in lumps of clay (Pl. 6.1) which have been studied by L. Costantini. Impressions of two-row hulled barley (*Hordeum distichum*), six-row barley (*H. vulgare* and *H. vulgare* var. *nudum*), eincorn wheat (*Triticum monococcum*), emmer wheat (*T. dicoccum*) and bread wheat (*T. durum/aestivum*) suggest that agriculture in Baluchistan was diversified and well developed by the end of the sixth millennium.

The faunal remains from the upper two meters of the Neolithic deposit have been studied by Richard Meadow. He finds a marked shift over time from an assemblage dominated by bones of hunted animals [e.g., gazelle (*Gazella dorcas*, Pl. 6.2), wild sheep (*Ovis orientalis*), swamp deer (*Cervus duvauceli*) and cattle (*Bos namadicus?*)] to one characterized almost exclusively by domesticated species [e.g., sheep (*Ovis ares*), goats and most importantly, cattle (Pl. 6.3)]. The identification of two bones from the water buffalo (*Bos bubalis*) from these same levels makes it the earliest evidence for this animal in South Asia.

Flint artifacts are the most numerous find in this period, with approximately 15,000 pieces. These belong to an industry dominated by blades and bladelets, geometric microliths, lunates, or a characteristic trapeze with a curved back. The microlithic types represent about four percent of the collection. This lithic industry shares many common features with epipalaeolithic sites in the Near East.

Nearly 700 square meters of the upper levels of the aceramic community have been exposed. These produced large rectangular buildings symmetrically divided into a number of rooms. Some of the buildings have small square compartments without doors that must have been storehouses (Pl. 6.4). Interspaced among these buildings are large cemeteries (Pl. 6.5). Some of the burials contain baskets coated with bitumen (Pl. 6.6). They also have ornaments of local stone, shell and bone (Pl. 6.7). Beads of imported semiprecious stone, such as turquoise (Pl. 6.8) and lapis lazuli, are also present. Another of the interments is associated with a copper bead giving interesting evidence for the use of metal in an aceramic context. Red ochre is commonly associated with the burials and in one case the traces of a red ochre-colored textile were visible on the bones. Cakes of red ochre were also found as grave goods along with polished stone axes, stone vessels, flint cores, blades and microliths.

On the southern edge of the Neolithic settlement a sloping deposit contained about twelve potsherds in a very coarse chaff-tempered ware. This is so far the first evidence of pottery in this part of Mehrgarh and it seems to come slightly later than the top level of the Mehrgarh Mound Three Neolithic settlement.

South of the Neolithic settlement are the remains of a fifth millennium occupation. A large rectangular building has been exposed with the same type of long plano-convex bricks used during the earlier Neolithic phase (Pl. 6.9). It is divided into 10 narrow compartments, symmetrically disposed on each side of a narrow corridor. This building, which is preserved in some places to a height of one meter, has no door and seems to have been used as a storeroom, just as were the buildings mentioned in the Neolithic settlement. Its use as a granary would explain the large number of barley and wheat imprints noticed in the compartments. Two very well preserved sickles with three bladelets hafted slantwise in bitumen have also been found in one of the compartments. Outside this building, along the western wall, a large fireplace was found to contain several hundred charred grains. These are presently being studied by L. Constantini who has already identified several kinds of wheat including *Triticum aestivum-compactum* and barley. Some of the seeds have been identified as cotton (cf. *Gossypium* sp.). But these seeds are very carbonized, often broken and are in such a bad state of preservation that it is difficult to know if they belong to the wild or cultivated species. But their occurrence among the other seeds of cultivated cereals, in a fireplace apparently associated with a "granary," would suggest that their presence is not accidental. It therefore cannot be denied that cotton was cultivated in the fifth millennium for either its oil or fibrous properties. But, a certain amount of caution is called for in this matter and further information on the cotton from Mehrgarh is awaited.

Along the southern wall of the "granary" are the remains of a steatite cutter's workshop. This has various stone tools, including a few drills. On the eastern side of the same building, heaps of bones were mixed with ashes. About one hundred bone awls were collected here (Pl. 6.10). It seems that a bone industry was associated with the garbage resulting from intense butchering activity. Thus, the awls may have been used for working animal skins on this very spot.

A limited number of sherds in a fine burnished red ware have also been found in and outside the building. Most of the vessels are pear-shaped jars. It is interesting to note that these pots were shaped on a rotating device, probably a wheel, and extended with dabber. Two human figurines in clay were also found. They are very stylized; one is in a seated position, the other, which is truncated, is decorated with small discs pasted around its base (Pl. 6.11). Another terracotta figurine is of a stylized four-legged animal, and it comes from the same area within the site. These figurines, to which one must add a lower part of a seated example from the Neolithic levels of Mehrgarh Mound Three, demonstrate that representations of humans and animals are to be found in the earliest cultural assemblages known in Baluchistan. By the very end of this period (Period II in the general sequence at Mehrgarh), comes the first occurrence of painted pottery. This is definitely wheel-thrown, with very simple geometric patterns in the Kili Ghul Mohammad II style. It is associated with a large number of handmade sherds, some of them with basket marks.

The discoveries made at Mehrgarh in the deposits of the fifth and sixth millennia have a deep significance. They reveal the great antiquity of a farming economy, of craft specialization and of long distance contacts (turquoise, lapis lazuli and sea shells) in Baluchistan. Further excavations in the deepest Neolithic deposits, so far unexplored, will throw new light on the part played by the northwestern regions of the Indo-Pakistan Subcontinent in the cultural processes which led to the development of the earliest farming communities. The cultural traditions of the third and fourth millennia in Baluchistan and the Indus Valley are deeply rooted in local traditions beginning with a very early Neolithic.

At the beginning of the fourth millennium B.C. Mehrgarh (Period III) becomes a mass production center for wheel-turned pottery. The vessels, often of a fine fabric, are decorated with geometric motifs of the Kili Ghul Mohammad III style, or with caprid and bird representations of the Togau style (Pl. 6.12). Workshops where lapis lazuli, turquoise, carnelian and sea shell were worked are also associated with this period which marks an important stage in the development of craft activities. The presence of several microdrills in green stone (phtanite) found in association with stone beads is worthy of note (Pl. 6.13). This is so far the earliest evidence for these tools of remarkable workmanship. Their ends are slightly hollow and highly polished, suggesting the use of a bow drill. Tools like these are found in later contexts at Shahr-i Sokhta, Shahdad as well as Indus sites such as Chanhudaro (Mackay 1937).

This period can be considered a phase of technological innovation, and one within which there was a diversification of agriculture. It witnesses the earliest appearance of oats (*Avena* sp.) and the addition of *Triticum sphaerococcum* to the group of wheats already present in earlier times.

At about 3500 B.C. the main period of occupation (IV) at Mehrgarh begins. This phase is known in Baluchistan through the pioneering work of W. A. Fairservis who designated it "Damb Sadaat I." Domestic buildings with small, low doors and open spaces where household activities were carried on, have been exposed (Pl. 6.14). The floors of these open spaces, where many fragments of large storage jars were found, are full of barley imprints. In this period there are beautiful examples of polychrome pottery with geometric decorations in red, white and black. Large, semiconical vessels on small pedestals, decorated with intricate geometrical patterns in bright colors are masterpieces (Pl. 6.15). Some of the painted pottery is decorated with the geometric motifs of the Togau B and D styles. But the painted wares, which represented almost 30 percent of the sherds in Period III, now account for less than 15 percent. At the same time there is a remarkable development in the range of shapes in plain ware. This includes "eggshell" goblets and sturdy storage jars. The first stamp seals of terracotta and bone occur in Period IV. The female figurines, which still resemble the early Chalcolithic prototypes, now have pendulous breasts.

By about 3200 B.C. a phase is reached which is well known in the Indo-Iranian borderlands. This period marks the beginning of Shahr-i Sokhta in Eastern Iran, of Period III at Mundigak and of Damb Sadaat II in the Quetta Valley. This period, which extends from 3200 to 2500 B.C. has already been dealt with, in previous papers on Mehrgarh VI and VII (Jarrige 1979: 85–87; Jarrige and Lechevallier 1979: 501–34). During this time Mehrgarh is a part of a large interaction zone extending over most of the Indo-Iranian borderlands. The mass production of pottery and terracotta figurines is one of the main activities of the site. Some of the finest specimens of the Faiz Mohammad style Black on Gray Ware have been found close to kiln areas. The human figurines, with diversity in hairdressing, a variety of ornaments and painted in yellow, reflect the existence of a rather sophisticated society. The remains of a huge brick platform faced with a plastered wall is probably connected to a monumental complex. During this period there are some indications of urbanization similar to those noted at Rahman Dheri by the team from the University of Peshawar.

The upper levels of Mehrgarh, with a cultural assemblage corresponding to Damb Sadaat III in the Quetta Valley, have an increase in the percentage of micaceous pottery in the Kot Dijian fabric. Triangular terracotta cakes, long parallel-sided blades (reaching a length of 18 centimeters) and several other elements which will be found in the Mature Harappan cultural assemblage, begin here.

Mehrgarh has produced a long history of man's adaptation to the Indus Valley. This begins with the earliest settling by farming peoples, and goes through the middle of the third millennium. Just prior to 2500 B.C. the site is integrated into the Early Harappan as defined by Dr. M.R. Mughal (1970). Mehrgarh is then abandoned. But, eight kilometers to the south, at Nowsharo, there is a Mature Harappan site which indicates that the Kachi Plain was definitely a part of the Harappan territory.

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M. RAFIQUE MUGHAL

7. Recent Archaeological Research in the Cholistan Desert

INTRODUCTION

In 1974, the Department of Archaeology and Museums, Pakistan launched a major program of field research in the Cholistan Desert of former Bahawalpur State in the East-Central Indus Valley. The purpose of this preliminary survey was to locate and identify the full range of archaeological remains in this little-known region. The Cholistan Desert, an area of extreme aridity, was originally watered on its western fringes by a river now called the Hakra in Pakistan and the Ghaggar in India. Of particular interest was the now dry bed of this river.

A part of this region was first explored by Sir Aurel Stein in 1941 (Stein 1942). In 1955 Henry Field (1959) re-examined a part of Stein's track. On the Indian side, the dry bed of the Ghaggar River was surveyed by A. Ghosh (1952) and later by B.B. Lal and B.K. Thapar, who extensively excavated the Harappan site of Kalibangan. A zone along the Sutlej River was explored by K.N. Dikshit and the area near Anupgarh and Nohar on the Ghaggar river reviewed by Katy F. Dalal (1980). The major work in Haryana and the Punjab (east) was carried out by Suraj Bhan (1973 and 1975) which he continued in 1977 with Jim G. Shaffer (Suraj Bhan and Shaffer 1978).

RECENT SURVEYS

Our surveys were concentrated along 300 miles of the dry bed of the Hakra River, within an approximately 10 to 15-mile-wide strip (Mughal 1980a. b). The project was directed by the author for four seasons between 1974 and 1977. Beginning at the Indian border near Fort Abbas, we covered 110 miles, to Fort Derawar, during the first season. The settlement pattern that emerged from the first season's work was most encouraging in terms of understanding the character, distribution and location of various sites of the Harappan Civilization. The highest concentration of sites was found around Fort Derawar and to its southwest (Figs. 7.1 and 7.2), an area which had not been previously explored. As the work progressed, the pivotal importance of this region began to emerge. It is now clear that this is a key region for understanding the developmental stages of the Harappan (or Indus) Civilization.

THE SITES

A total of 414 sites have been mapped along 300 miles of the Hakra River bed (Mughal in press). They range in time from at least the fourth millennium B.C. to the Medieval Period. The protohistoric sites fall into the various periods of development (Table 7.1).

The sites cover the long, continuous sequence of development and change of the Indus Civilization, encompassing the period from the fourth to the beginning of the first millennium B.C. The protohistoric settlement pattern in Cholistan has largely remained undisturbed to the present time and it is an important laboratory for the study of prehistory. The main features of each cultural phase are briefly reviewed in the following pages.

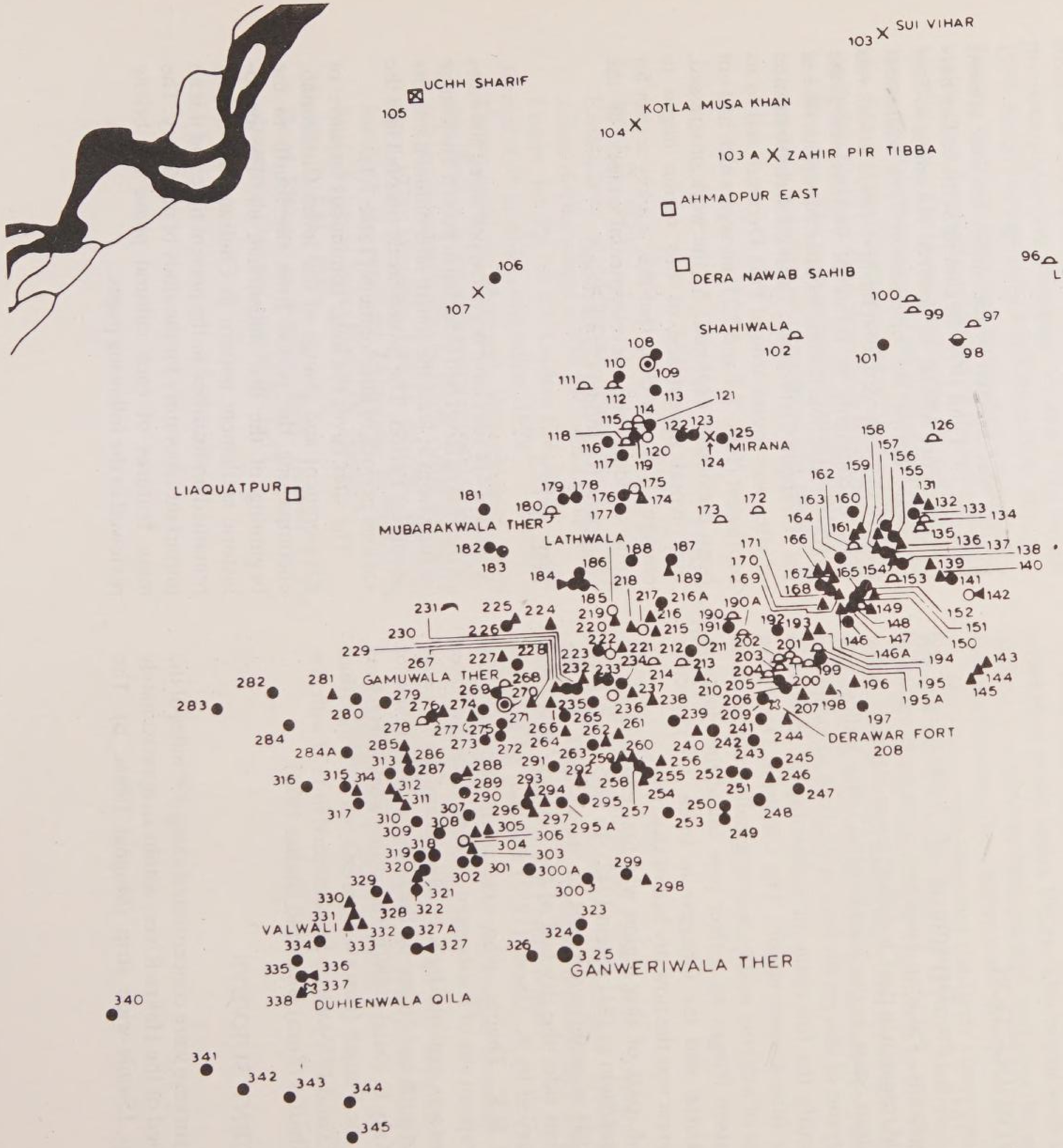
SUI VIHAR
UCHH SHARIF
KOTLA MUSA KHAN
ZAHIR PIR TIBBA
AHMADPUR EAST
DERA NAWAB SAHIB
SHAHIWALA
YAZMAN
KUDWALA
LUREWALA
FORT BARA
DINGARH
MIRANA
LIAQUATPUR
MUBARAKWALA THER
LATHWALA
GAMUWALA THER
DERAWAR FORT
GANWERIWALA THER
VALWALI
DUHIENWALA QILA

Fig. 7.2. Ancient sites in the Central Hakra region.

Table 7.1

Approximate time range	Cultural association	Number of sites
Fourth millennium B.C.	Hakra Wares (Jalilpur I related)	99
Early third millennium B.C.	Early Harappan (Kot Diji related)	40
Mid and late third millennium B.C.	Mature Harappan (Mohenjodaro and Harappan related)	174
Early second millennium B.C. and later	Late Harappan (Cemetery H related)	50
End second and early first millennium B.C.	Post or non-Harappan (Painted Gray and Black-and-Red Wares related)	14

Note: Some sites have more than one cultural phase.

KEY TO THE MAPS OF SITES

Site No.	*Name of site*	*Site No.*	*Name of site*	*Site No.*	*Name of site*
1.	Raowali	27.	Gamanwala	54.	Wariyal–F
2.	Chak 258 HL	28.	Ladulai	55.	Wariyal–H
3.	Chak 265 HR	29.	Gujranwala	56.	Wariyal–G
4.	Ahmadwala Toba	30.	Chak 337 HR	57.	Hanaswala
5.	Channanwala Ther	31.	Kandianwali	58.	Guddal–B
6.	Theriwala	32.	Chapliwala (West)	59.	Guddal Ther
6A.	Bahadrianwala	33.	Chapliwala (East)	60.	Guddal–A
7.	Phulra Fort	34.	Chapuwala	61.	Wakkarwala
8.	Chak 270 HR	35.	Chak 341	62.	Bokhariyanwala
9.	Chak 271 HR	36.	Jathewali	63.	Bokhariyanwala–A
10.	R.D. 66	37.	Chak 353 (West)	64.	Bazariwala
11.	Rajuwala	38.	Mansura	65.	Jatoiwala–A
12.	Sandhanawala	39.	Chak 323 HR	66.	Jatoiwala–B
13.	Satkui (East)	40.	Satwali	67.	Kuchanwala
14.	Satkui (West)	41.	Gharanwali	68.	Ahmadwala Ther
15.	Chak 280 HR	42.	Jalwali	69.	Lal Patel
16.	Chak 281 HR	43.	Trillar	70.	Tarsoolwala
17.	Quraish Ther	44.	Akhera	71.	Jatoiwala Ther
18.	Chak 285 HR	45.	Malhalewala Ther	72.	Hakim Ali Ther
19.	Chak 298 HR	46.	Bokharaiwala	73.	Chak 88
20.	Mirgarh Fort	47.	Mojgarh Fort	74.	Chak 88A (West)
21.	Jamgarh Fort	48.	Mojgarh Ther	75.	Chak 69
22.	Chak 308 HR	49.	Chipwala	76.	Kudwala
23.	Chak 314 HR	50.	Kalepar (Bhoot)	77.	Wariyal–A
24.	Kirarwali	51.	Khewtal	78.	Wariyal–B
25.	Chak 315 HR	52.	Wariyal Ther	79.	Wariyal–D
26.	Marot Fort	53.	Wariyal–E	80.	Wariyal–C

Site No.	*Name of site*
81.	Gharaiyanwala
82.	Ali Mohd Wala Ther
83.	Chak 45
84.	Maujhalwala
85.	Chak 45B (North)
86.	Chak 45A (South)
87.	Chak 44
88.	Boharwala Ther
89.	Chak 51
90.	Kaliyar
91.	Rohatwala
92.	Chak 103
93.	Chak 107
94.	Chak 61 (East)
95.	Chak 61 (West)
96.	Lurewala
97.	Ratta Ther
98.	Dunkkian
99.	Turanwala
100.	Phukhi Ther
101.	Kuruwala
102.	Shahiwala
103.	Sui Vihar
103A.	Zahir Pir Tibba
104.	Kotla Musa Khan
105.	Uchh Sharif
106.	Mehmudabad
107.	Sukkarwala
108.	Chak 75
109.	Chak 76
110.	Dundkianwali
111.	Shaikhanwala Ther
112.	Dabli Theri
113.	Chak 97
114.	Siddhuwali–E (or Lumrywala)
115.	Siddhuwali–F
116.	Bulbaliwala
117.	Khohi Siddhuwali
118.	Siddhuwala Ther
119.	Siddhuwali–B
120.	Siddhuwali–C
121.	Siddhuwali–D
122.	Khatranwali–II
123.	Khatranwali–I
124.	Chak 131
125.	Mirana
126.	Rawewala
127.	Bagrauwala Ther
128.	Bara Fort
129.	Bara Ther
130.	Dingarh Fort
131.	Dabli (West)
132.	Dabli (East)
133.	Sullewala
134.	Cheelanwali
135.	Cheelanwala–B
136.	Killianwali–D
137.	Jiwaiwali
138.	Waddanwala
139.	Bahilawala–C
140.	Bahilawala–B
141.	Bahilawala Ther
142.	Nahranwala
143.	Turawewali–C
144.	Turawewali Theri
145.	Turawewali–B
146.	Khingarwali
146A.	Naharwali–B
147.	Khan Kandewala–A
148.	Khan Kandewala–E
149.	Akkanwali Theri
150.	Khan Kandewala–B
151.	Khan Kandewala–D
152.	Achharwala
153.	Wavriwala
154.	Waddanwali
155.	Killianwali–C
156.	Killianwali–B
157.	Killanwali
158.	Bandwali
159.	Lundwali–III
160.	Dhedaniwala Ther
161.	Lundewali–IV
162.	Lundewali–II
163.	Lundewala Ther
164.	Jalwali–A
165.	Khan Kandewala–C
166.	Jalwali–B
167.	Changalawala–C
168.	Changalawala Ther
169.	Naharwali
170.	Oinwala Ther
171.	Changalawala–B
172.	Daiwala
173.	Gopawala
174.	Hotewala–II
175.	Hotewala Ther–A
176.	Hotewala Ther–B
177.	Garakwala
178.	Jamuwali–A
179.	Jamuwali–B
180.	Mubarakwala Ther
181.	Butewala
182.	Lunida–II
183.	Lunida–I
184.	Sanukewala–II
185.	Sanukewala
186.	Sanukewala–III
187.	Kalharwala
188.	Drigwala
189.	Kalharwala–B
190.	Kaiyanwala–II
190A.	Trekoe
191.	Kaiyanwala–I
192.	Dilwashwala
193.	Payunewali Bhit–II
194.	Payunewali Bhit–III
195.	Payuna Bhit
195A.	Mehruband Ther
196.	Qadir Bux Theri
197.	Shikarwala Ther
198.	Litanwala
199.	Goongal Mar
200.	Magrejewali
201.	Bazariwali–C
202.	Bazariwali–B
203.	Bazariwali–A
204.	Singharwali
205.	Gadiwali
206.	Mahiwali
207.	Thoom Thali
208.	Derawar Fort
209.	Derawar Ther
210.	Chaudhryanwala
211.	Jhumtiwala
212.	Charhoyanwala
213.	Ghumharianwala
214.	Marechiwala
215.	Merechi Kanda
216.	Merechi Kanda–II
216A.	Garewala
217.	Merechi Kanda–III
218.	Luppewala–III

Site No.	*Name of site*
219.	Lathwala
220.	Lathwala–II
221.	Luppewala
222.	Luppewala–II
223.	Chiheywali
224.	Baggewali
225.	Gajjuwala–II
226.	Gajjuwala Ther
227.	Sadwala Kanda
228.	Hasilwala Ther
229.	Niwaniwala Ther (West)
230.	Niwaniwala Ther (East)
231.	Niwaniwala–II
232.	Niwaniwala–III
233.	Azimwala–II
234.	Azimwali
235.	Azimwali–A
236.	Azimwali–B
237.	Azimwali–C
238.	Shidiwala–A
239.	Batoorwala
240.	Khanpuri–II
241.	Sauransanda
242.	Khanpuri
243.	Kikriwala Ther
244.	Abduwali
245.	Kikri
246.	Kikri–II
247.	Bhagriwala
248.	Qasaiwala
249.	Tharulawala Ther
250.	Janiwali
251.	Dadwala–II
252.	Dadwala Ther
253.	Runwali
254.	Darkhanwala Ther
255.	Darkhanwala–II
256.	Sheruwala–II
257.	Sheruwala Ther
258.	Chandnewala Ther
259.	Chandnewala–II
260	Sheruwala–III
261.	Chikrala
262.	Parhara
263.	Parharewala–A
264.	Chore
265.	Wasuwala Ther
266.	Musafarwali–II
267.	Musafarwali
268.	Gamuwala Ther
269.	Gamuwala Dahar
270.	Gamuwali
271.	Mehrianwala Ther
272.	Mehrianwali–II
273.	Adhi–III
274.	Adhi–II
275.	Adhi–I
276.	Bhootanwala–C
277.	Bhootanwala–A & B
277A.	Bhootanwali–II
278.	Bhootanwali
279.	Noor Shah Ther
280.	Ambrawala Ther
281.	Ambrawali
282.	Ghaziwala Ther
283.	Laluwala Ther
284.	Baghwala Ther
284A.	Sanghewala
285.	Sohniwali
286.	Sohniwali–II
287.	Khiplewala–II
288.	Jawaiwala–II
289.	Jawaiwala Ther
290.	Kuppianwala
291.	Chorewala
292.	Lakhman
293.	Jhalar
294.	Jafawala–III
295.	Chandnewala–III
295A.	Jafewali Theri
296.	Jafawala
297.	Jafawala–II
298.	Rahmanwali
299.	Barriwala Ther
300.	Rappwala Ther
300A.	Chakwali
301.	Badalwala–II
302.	Badalwala
303.	Jangipar
304.	Badalwala–III
305.	Badalwala–IV
306.	Badalwala–V
307.	Mehrindawala Ther
308.	Sheikhri–II
309.	Bootewali
310.	Khiplewali–III
311.	Khiplewali–II
312.	Khiplewali
313.	Khiplewala
313A.	Khiplewala
314.	Jhandewala–II
315.	Jhandewala Ther
316.	Burhanewala Ther
317.	Mashinewala
318.	Develiwala–II
319.	Develiwala Ther
320.	Mehwali
321.	Mehwali–II
322.	Mahawala Ther
323.	Barula–II
324.	Barula–I
325.	Ganweriwala
326.	Bilewali
327.	Thoriwala
327A.	Tharwala
328.	Safuwala–III
329.	Safuwala–IV
330.	Safuwala Ther
331.	Safuwala–II
332.	Valwala–II
333.	Valwali
334.	Thakowala
335.	Dhuhinwala Ther
336.	Dhuni
337.	Duhienwala Qila
338.	Dhuni (South)
339.	Moniwala
340.	Gaddawala Ther
341.	Jejalam
342.	Rajbai
343.	Shadiwala Ther
344.	Sheikhwali
345.	Karowala
346.	Sanasiwala
347.	Khairgarh Fort
348.	Khairgarh Ther
349.	Malluwali–I
350.	Malluwali–II
351.	Onchi Ther
351A.	Kot Ghunia
352.	Shah Garh Ther
353.	Ratta–I
353A.	Chak 124
354.	Ratta–III

Site No.	*Name of site*	*Site No.*	*Name of site*	*Site No.*	*Name of site*
354A.	Chak 121	360.	Ghatoro	366.	Chak 143 P
355.	Ratta–II	361.	Pattan Minara	367.	Kot Murid
356.	Baggapura Ther	362.	Bhagla Fort	368.	Nawan Kot
357.	Baggapura–II	363.	Jummewala Tibba	369.	Khangarh Fort
358.	Chak 112 P	364.	Chak 139 P	370.	Rukanpur
359.	Machki Fort	365.	Falji Fort		

Note: Among 414 sites listed, the map shows 385 sites. In the map, an area about thirty miles long on southwest and entire desert on south containing sites of the Medieval Period are omitted. The sites not shown on the map are: Medieval/Early Historical = 14, Hakra = 5, Mature Harappan = 8, and Late Harappan = 2. The final report on Bahawalpur Survey (in press), however, contains details of all the listed sites.

THE HAKRA WARES PERIOD

The oldest known cultural assemblage in Cholistan is represented by 99 sites of varying dimensions. These settlements are generally low mounds in lesser Cholistan (Bahawalnagar and Bahawalpur Districts) and are located close to, or in, the *dahars* (mud flats). In greater Cholistan (Rahimyar Khan District), they also occur on sand dunes. This assemblage has been called "Hakra" because of the initial area of discovery and the great concentration of sites along the Hakra flood plain.

Hakra ceramics are very distinctive. They are both wheelmade and handmade red wares with a variety of surface treatments. The most frequent and conspicuous pottery types include: (a) those treated on the external surface with a secondary coating of mud mixed with bits of pottery called "mud applique" (Pl. 7.1); and (b) pottery with a series of incised lines on the external surface called Hakra Incised (Pl. 7.2). Most of the Hakra Mud Applique Ware consists of handmade, thick-bodied vessels tempered with clay. There are also some wheelmade, thin-bodied pots with a fine fabric. The thin-bodied pottery has an everted rim and is painted in black on a deep red or chocolate slip which is confined to the shoulder just below the rim. The resemblance of the Hakra Mud Applique Ware in vessel form and surface treatment to some of the handmade pottery from the earliest levels of Amri IA (Casal 1964: Fig. 45) is most striking. At Amri, this pottery occurs in levels which would certainly date to earlier than 3500 B.C. by radiocarbon. Also included in the Hakra Wares is red pottery with a black slip all over the body. The black slip on many specimens appears to be burnished to a glossy finish. A Hakra Wares site called RD 89, located just few kilometers east of Pakistan's border in Anupgarh Tehsil in Indian territory, has yielded precisely identical black-slipped or burnished pottery along with Hakra Mud Applique and Incised Pottery (Dalal 1980: Figs. 8 and 9). Material comparable to this Hakra black-slipped or burnished pottery is not yet known in the Greater Indus Valley at fourth millennium B.C. sites. However, the exposed levels at Periano Ghundai in the Zhob Valley of northern Baluchistan (west of the Gomal Pass) that have been grouped under the term "Periano A" (Mughal 1972a: 140) yielded black burnished/slipped pottery in association with a handmade basket-marked ware.

The Hakra Wares assemblage also includes a small percentage of distinctive buff wares. These were wheelmade and painted black in a style that recalls the fourth millennium B.C. ceramic tradition of the Pakistan-Iranian borderlands.

It is too early to say whether or not the combined form and decorative styles of the Hakra Wares indicate the beginnings of the diagnostic Kot Dijian ceramic assemblage. It is known, however, that such pottery forms overlap the Kot Dijian Wares at Jalilpur (Mughal 1972b and 1974).

Other finds of the period include: animal figurines with short, joined legs including those of bulls and cows; shell and terracotta bangles with triangular and rectangular sections; fragments of grinding stones; bits of copper and a great number of other implements. The lithic industry has parallel-sided blades, most of which have reworked edges; microblades, borers, leaf-shaped arrowheads, scrapers and cores (Pl. 7.3). Typologically it appears to compare well with the lithic materials from Jalilpur I and II, the Neolithic Period I of Sarai Khola (Halim 1972), Gumla I (Dani 1971) and even Rahman Dheri (Khan 1979).

The Hakra Wares sites are heavily concentrated around Derawar Fort and to the southwest with a few sites to the east of Derawar. Most of the sites are single period settlements with only Hakra Wares; but two (Nos. 67 and 142 on Fig. 7.1) were occupied in the succeeding Early Harappan Period and four sites (Nos. 184, 233, 327 and 336) have Mature Harappan remains. None of the Hakra Period sites was occupied during the Late Harappan Period. Among 99 sites, 52.5 percent were camp sites; 45.4 percent were settlements; while 2 percent contain kilns within the settlement areas.

THE EARLY HARAPPAN PERIOD

The cultural phase that follows the Hakra Wares Period in Cholistan is represented by characteristic Kot Dijian ceramics and associated materials. These are already well known from other sites in the Greater Indus Valley and can be assigned by radiocarbon dating to the early third millennium B.C. Within the Greater Indus Valley there is a basic similarity of material culture at this time, despite the presence of some regional variation. Equally to the point, however, is the apparent continuity of development in the material culture between this Early Harappan and the succeeding Mature Period. Thus, Kot Diji and Kot Diji-related sites in Pakistan and parts of India together constitute the full Early Harappan Period, or the early urban, formative stage of the Harappan Civilization. It was during the Early Harappan Period that cultural processes leading to full urbanization began (Mughal 1980b).

In terms of material culture, continuity of several ceramic forms in the Early Harappan and Mature Harappan levels of Kot Diji is fully documented. A very recent reanalysis of small finds from the type site (Kot Diji) also clearly demonstrates this continuity throughout the lower (Early Harappan) and upper (Mature Harappan) levels. There are, however, certain exceptions (Mughal 1980a: 95 and 1980b).

Forty sites of the Early Harappan Period have been located in Cholistan. Most of these have a single occupation with ceramics related to the Kot Dijian, Kalibangan I, Siswal A (Suraj Bhan 1972) and Binjor 1 and 3 (Dalal 1980) (Pls. 7.4 and 7.5). They are also comparable in form and surface treatment to pottery from Jalilpur II, Sarai Khola II, Gumla II-IV, Rahman Dheri and other contemporary sites in Bannu Basin and Taxila Valley (Mughal in press). Only three sites (Nos. 12, 109 and 270) were reoccupied during the Mature Harappan Period in Cholistan. This is a pattern found elsewhere in the Greater Indus Valley and Baluchistan.

The Early Harappan Period is marked by an increase in the size and number of functionally articulated sites, at least as compared to the preceding Hakra Wares Period. There is a very sharp decline in the number of camp sites: 7.5 percent of the total during the Early Harappan Period against 52.5 percent during the Hakra Period. There is a slight increase (57.5 percent) in the frequency of purely settlement sites. But, the interesting change is an increase to 35 percent in multifunctional settlements, that is, those combining residential functions with specialized/industrial activities. In the Hakra Wares Period only two percent of the sites were of this type. This shift seems to be significant in terms of sociocultural changes that occurred by the beginning of the Early Harappan Period in Cholistan.

About 60 percent of the Early Harappan sites here are smaller than five hectares in overall size. Twenty-five percent are between five and ten hectares. One site, Gamanwala (No. 27 on Fig. 7.1) spreads over an area of 27.3 hectares, while another Early Harappan site, Jalwali (No. 42) is 22.5 hectares in size. Gamanwala is so far the largest known settlement of the Early Harappan Period. It is larger than Rahman Dheri (21.7 hectares), and also Kalibangan, where the total area occupied during the Early (KLB-I) and Mature (KLB-II) Harappan Period measures 22 hectares, excluding the cemetery area. Gamanwala is close to half the size of Harappa (which is 65 hectares or 160.6 acres without cemeteries) and was certainly not a small town. It is thus evident that during the Early Harappan Period, large settlements—towns, if not large cities—emerged amidst a cluster of smaller settlements. This is a distinctive feature of Harappan settlement patterns, especially in Cholistan, where original cultural patterns have remained largely intact.

During the Early Harappan Period the main focus of occupation appears to have been between Yazman and Fort Abbas, where there are few settlements of the Hakra Wares Period. This pattern seems to extend across the border in India past Kalibangan, to Banawali near Fatehbad, and even beyond, along the ancient course of the Chautang River in Hissar and Rohtak districts. The succeeding Mature, or fully urbanized stage of the Harappan Civilization, is marked by a major shift in the settlement pattern along the Hakra as regards area of settlement concentration.

THE MATURE HARAPPAN PERIOD

This phase of cultural development is best represented at the cities of the Indus Civilization and at 174 sites in Cholistan (Pls. 7.6, 7.7 and 7.8). The most striking aspects of the Mature Harappan Period in Cholistan are: (1) a general shift of sites from the northeast to the southwest, around and beyond Derawar Fort, (2) an increase in the number (47.7 percent of the total), size and height of settlement sites, among which at least one (No. 325), Ganweriwala at 81.5 hectares in size, is essentially the same size as Mohenjodaro, and (3) a profusion of industrial sites (45.4 percent) and their clear separation from habitation areas. However, sites combining both residential and industrial functions (19 percent out of 47.7 percent total settlements) also occur. In the preceding Early Harappan Period industrial areas were located close to, but outside the residential area at fourteen sites or 35 percent of the total number in that period. Although this feature persists in the Mature Harappan Period, some industrial areas at this time were demarcated exclusively for craft activities such as the firing of pottery, bricks, small terracotta objects, the glazing of faience objects and the melting, if not smelting, of copper. Cholistan, it may be pointed out, is located close to the copper sources of Rajasthan.* The Khetri-Singhana source in Jhunjhunu District was reportedly worked during Mauryan and Mughal times; although it is not certain that these sources were also worked in the protohistoric times. It may, however, be added that Sir Aurel Stein found a copper ingot at the (Late) Harappan site of Siddhuwala Ther (No. 118 on Fig. 7.1), located near Derawar. This site also contains numerous kilns.

The emergence of separate Mature Harappan industrial sites, or production centers, and the increased number of kilns during the Mature Harappan Period are indicative of: (1) marked social stratification, (2) the intensification of specialized activities responsible for making standardized products on a large scale, and (3) the existence of intersettlement trade or exchange.

The maximum expansion of the Harappan Civilization outside the primary Indus River Valley occurred in Mature times. After reaching a fully urbanized stage at its core, which may have been the central part of the Indus Valley, it spread towards the Baluch Hills, and along the Arabian Sea Coast. This corresponds in time to intense Harappan long distance sea trade or exchange.

THE LATE HARAPPAN PERIOD

By about the middle of the second millennium B.C. there are changes in Harappan material culture. These resulted from readjustments or changes in the socioeconomic and political organization of Harappan society. These may have been caused by: (1) the gradual depletion of economic resources resulting from the overutilization of land, (2) changes in the hydrographic pattern of the Indus Valley, (3) increased population pressures, (4) insecurity created by invading or intruding groups of people, or (5) a combination of various causes. But, whatever the reasons, it is certain that the pan-Indus integration of the Greater Indus Valley, which climaxed during the Mature Harappan Period, was weakened but not destroyed by the mid-second millennium.

The population regrouped and adjusted to the changed situation in the three principal regions. It thus managed to survive in a recognizable form for a considerable period of time, but some changes are reflected in the material culture found in each region of Harappan concentration: the Cemetery H Culture in the Punjab; the Jhukar Culture in Sind; and the Degenerate, Post or Late Harappan Culture in Gujarat. Regional differentiations, still within the Harappan ceramic tradition, can be seen in the pottery of each group. However, the characteristic square steatite seals with script, standard cubical weights, "mother-goddess" figurines and most metal tools disappeared.

In the upper Indus Valley, a distinctive body of ceramics was recovered from the surface of Harappa, as well as from a cemetery designated "H" at the same site. Similar material has been reported from two sites found by Stein in Bahawalpur. Indian archaeologists have also located and probed several sites with the Cemetery H Ware. These are generally located in the Punjab (east), even to the east of the Yamuna River, suggesting a spread of the Harappan tradition during the second millennium B.C. Until this research in Bahawalpur, the Late Harappan Phase was virtually unknown in Pakistan.

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*Editor's note: See R.C. Agrawala's paper in this volume for a discussion of these sources.

The recent survey of Bahawalpur has brought to light 50 sites with Cemetery H-related materials. Cemetery H material is essentially confined to the upper Indus Valley, just as the Jhukar-related materials of the Late Harappan Period generally occur in the lower Indus region.

In Cholistan the sites of the Late Harappan Period (Cemetery H-related) are large, high settlement mounds near the Hakra bed. There are also small sites concentrated around Derawar where the Hakra River once formed an inner delta as with the Helmand River in Seistan. There is an apparent constriction of site concentration in Cholistan during the Late Harappan occupation, as compared to that of the Mature Harappan (see Fig. 7.1). But it should be emphasized that Late Harappan sites are concentrated in the very same area where Mature Harappan sites are located, but where there are few Early Harappan settlements.

Exclusively industrial sites account for only 18 percent of total of Late Harappan sites. Settlement sites, and settlements with kilns or specialized activities areas, represent 28 percent of the total. Camp sites which decreased to only 5.7 percent in the Mature Harappan Period, increase markedly to 26 percent in the Late Harappan times.

Some sites with classic Cemetery H materials are high mounds. For example, the highest parts of Lurewala (No. 96), Shahiwala (No. 102) and Kudwala (No. 76) are respectively 41, 42, 46 feet above plain level. Without excavation, it has not been possible to determine how much of the occupation on these high mounds belongs to the Late Harappan Phase. Some sites, however, are quite extensive, spreading over 20, even 38 hectares.

The beautiful red pottery (Pls. 7.9 and 7.10) is often treated with a thick glossy slip and painted with black designs. Many vessel forms and other materials from the Late Harappan settlements in Cholistan compare well with what is known from contemporary sites in Pakistan and India. New wares of the Late Harappan Period include one with raised knob-like, elongated decorations. These form regular patterns on the external surface which appear to have been made on a thick secondary layer of clay. This type of ware has been christened "Harappan Wet." Its parallels in the Greater Indus Valley come only from Harappa where a complete vessel with similar surface treatment was found in association with burial pots of Stratum I (Vats 1940; Pl. LIX, 10).

THE POST OR NON-HARAPPAN PERIOD

Settlements of this period are concentrated in northeastern Cholistan where 14 sites with the well-known Painted Gray Ware (PGW) have been identified. This is the first time that PGW has been found in Pakistan. It is reported from 320 sites in India. These are located in northern Rajasthan, Haryana, the Punjab and western Uttar Pradesh (Tripathi 1975). The date of PGW and its cultural association have provoked a great deal of controversy that has led to considerable field research in India. It is generally assigned to the end of the second and the beginning of the first millennium B.C. (Lal 1977-78; 1978). although differing opinions still exist. Early excavations revealed a hiatus between the Late Harappan and the PGW assemblages, but recent work at Bhagwanpura, Dadheri and a few other sites has led to the claim of continuity between the Harappan tradition and the PGW Period (Joshi 1978). Connected to this is the question of the Black and Red Wares as regards their association with PGW in western Uttar Pradesh and eastern Rajasthan and their significance in the context of contemporary assemblages of East Punjab.

PGW sites in Cholistan are generally located in the middle of the former Hakra River bed. With the exception of one site (Satwali, No. 40), which covers 13.7 hectares, all the settlements are less than four hectares in size.

The classic PGW ceramic (Pl. 7.11) never constitutes more than five percent of the total surface collections from any site. The remaining pottery consists of red wares, often with stamped and relief designs on the external surface (Pl. 7.12), few black and red potsherds and dishes in red ware resembling the PGW form.

CONCLUSION

This survey of Cholistan has yielded a wealth of information on the cultural sequence in the central Indus Valley. It has given a new perspective and orientation for planning future research on the Indus Civilization. Sites of various periods, and their concentration or distribution, provides a reliable basis for reconstructing various changes in the course of the Hakra River, often identified with the Sarasvati of the Vedic period. The hydrographic history of the Sutlej-Yamuna Divide has often been discussed during the last one hundred years. This is summarized by Lambrick (1964) and Wilhelmy (1969). However, the most recent reconstruction of the changing courses of the Sarasvati, as proposed by Bimal Ghose and his colleagues (1979 and 1980), will require confirmation by archaeological or other dateable evidence.

On the Pakistan side, archaeological evidence now available overwhelmingly affirms that the Hakra was a perennial river through all its course in Bahawalpur during the fourth millennium B.C. (Hakra Period) and the early third millennium B.C. (Early Harappan Period). About the middle of the third millennium B.C., the water supply in the northeastern portion of the Hakra, roughly between Fort Abbas and Yazman (near Kudwala) was considerably diminished or cut-off. But, abundant water in the lower (southwestern) part of this stream was still available, apparently through a channel from the Sutlej; this is attested by the heavy clustering of sites in that area during the late third and early second millennium B.C. (Mature and Late Harappan Periods respectively). About the end of the second, or not later than the beginning of the first millennium B.C., the entire course of the Hakra seems to have dried up and a physical environment similar to that of present day in Cholistan set in. This forced the people to abandon most of the Hakra flood plain. A few Painted Gray Ware settlements, most of them smaller than four hectares in size, are located along the upper part of the Hakra River. These were sustained by a meager water supply reaching there with seasonal regularity from the Ghaggar.

Though the physical environment of Cholistan has changed since protohistoric times, the original mosaic of the settlement pattern is well preserved. The recent field research reported here has revealed functionally differentiated sites within chronologically defined cultural horizons. This will enable one to recognize and reconstruct changes in this region that have not yet been recognized elsewhere in South Asia. Furthermore, archaeological evidence is a reliable guide for the history of dune formation in Bahawalpur. For example, the presence of Hakra Ware sites on top of old, reddish-brown sand, as observed on the south and southwest of Derawar, would seem to indicate that the Cholistan part of the Thar Desert had already advanced close to Derawar prior to the fourth millennium B.C.

NOTE

Dr. Mughal was not a participant in the Srinagar conference. His work in Cholistan is so important, however, that this paper was solicited.

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GEORGE F. DALES

8. Mohenjodaro Miscellany: Some Unpublished, Forgotten, or Misinterpreted Features

NO SITE of the ancient Indus Civilization has received more archaeological and scholarly attention than Mohenjodaro. Most widely known are the large-scale excavations directed from 1922 to 1927 by Sir John Marshall (1931) and from 1927 to 1931 by Ernest Mackay (1938), the publications of which provide the basic archaeological data for the study of the site. Also, well known are the excavations conducted in 1950 on the so-called Citadel Mound by Sir Mortimer Wheeler (1950, 1968). And finally in 1964-65 the University of Pennsylvania Museum sponsored excavations along the western edge of the old HR Area (Dales 1965a, 1965b, 1966). These latter excavations were conducted just prior to the imposition of a total moratorium on new work at the site by the Government of Pakistan, a restriction that will probably continue indefinitely.[1]

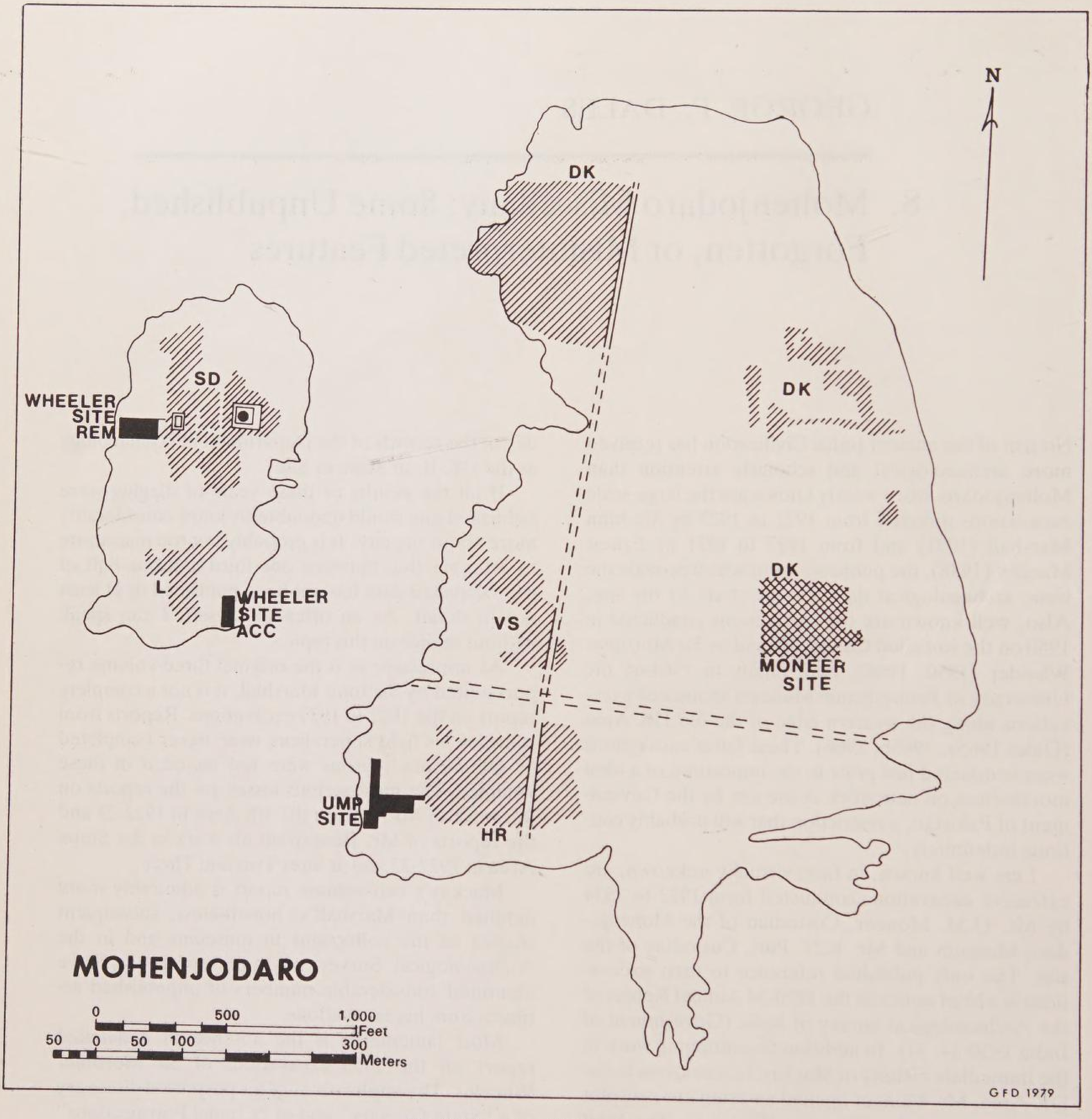
Less well known, in fact, virtually unknown, are extensive excavations conducted from 1932 to 1934 by Mr. Q.M. Moneer, Custodian of the Mohenjodaro Museum and Mr. K.N. Puri, Custodian of the site. The only published reference to their excavations is a brief notice in the 1930-34 Annual Report of the Archaeological Survey of India (Government of India 1930-34: 51). In addition to continuing work in the immediate vicinity of Mackay's excavations in the DK Area, Mr. Moneer opened an extensive new plot directly east of the VS Area (Fig. 8.1). The brief notice states that "As, unfortunately there is no photographer and no draftsman attached to the site anymore, no illustrations can be given to these latter diggings" (Government of India 1930-34: 51). Largely forgotten, these excavations are known today in the records of the Department of Archaeology as the DK-B, or Moneer Site.

If all the results of these years of digging were published one would undoubtedly know considerably more about the city. It is probably not too inaccurate to estimate that between one-third and one-half of the excavated data has not been published or at least not in detail. As an offender myself, I can speak without malice on this topic.

As impressive as is the original three-volume report edited by Sir John Marshall, it is not a complete report on the 1922 to 1927 excavations. Reports from some of his field supervisors were never completed or for various reasons were not included in these volumes. The most serious losses are the reports on the work of Mr. Vats in the VS Area in 1922-23 and the reports of Mr. Banerji on his work in the Stupa Area in 1922-23 and at Sites Two and Three.

Mackay's two-volume report is admirably more detailed than Marshall's, nonetheless, subsequent studies of the collections in museums and in the Archaeological Survey of India storerooms have identified considerable numbers of unpublished artifacts from his excavations.

Most lamentable is the absence of a detailed report on the 1950 excavations of Sir Mortimer Wheeler. The implications of his purported discovery of a "State Granary" and of "Citadel Fortifications" are crucial for any interpretation of the nature and function of Mohenjodaro as a city. There is no end to the speculation these claims have aroused but it is impossible to reach objective conclusions with the published details. Some of this data has recently been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GFD 1979

Fig. 8.1. Site plan of Mohenjodaro.

rediscovered as I will describe later in this paper.

The lack of any records or reports on the excavations of Moneer and Puri comprises serious loss of potentially valuable data. The Moneer Site is extensive—almost half the area of the HR excavations. It is noteworthy that it is not indicated on any of the published plans of the site or mentioned in any descriptions of the city. Recently, its very existence was rediscovered independently by A. Parpola and I. Mahadevan during their studies of seals and inscribed artifacts in collections in Pakistan and India. Parpola (1972: 13) studied over 400 unpublished seals, "a special group being the seals from the DK-B and DK-I Areas of Mohenjodaro." Mahadevan (1977: 4) mentions finding photographs of unpublished seals from Mohenjodaro in the Photo Library of the Archaeological Survey in New Delhi. He informs me (personal communication) that excavation was also done sometime between 1935 and 1940. He found no mention of the excavator's name but he thinks the work area was designated DK-B. Seals and other antiquities were found by Mahadevan in New Delhi. Photographs of these objects as well as a part of the excavations were found in the Photo Album, Sind, Vol. XXVI (1935-40). There is thus some confusion as to exactly where the excavations designated DI-1, DI-i, or DK-B or Moneer Site were conducted. I was told directly by the Director of Archaeology in Karachi that the area so designated on Figure 8.1 is the DK-B/Moneer Site.

Both Parpola's and Mahadevan's interests were only in the inscribed artifacts and it was not until the winter of 1978-79 that the Moneer Site itself attracted serious attention. Dr. Michael Jansen, the archaeological architect directing a detailed study of the Mohenjodaro architecture, came upon a detailed plan of the site prepared by a Dutch engineering firm in 1968 as part of the preliminary work for developing a conservation program for the site (UNESCO 1968). The plan, drawn from aerial photographs of the site, clearly shows the Moneer Site with an approximation of the architectural plan. The plan is important also because it is the only one that has detailed contours in metric measurements and shows the locations of all the borings and test drillings used in formulating a master plan for preserving the site (UNESCO and Government of Pakistan 1968).[2] A former superintendent at Mohenjodaro, Mohammad Siddique, has informed me that some of the pottery and objects from the Moneer excavations are in the Mohenjodaro Museum storeroom and that he has personally done the best he could to arrange and catalog the collection. Unfortunately, there are no records giving specific proveniences for any of it. Mr. Mahadevan informs me that what is probably the balance of the excavated artifacts is in Delhi with the Archaeological Survey of India.

Dr. Jansen and I visited the Moneer Site in February 1979 and were astounded at what we saw. The size of this neglected excavation is impressive enough in itself but the general appearance of the architecture gave a very different feeling than those experienced from other parts of the city. The structures seem smaller, with thinner walls in general, and though neatly oriented and arranged along straight streets and lanes, they seem to be more crowded. This is an impressionistic view only and must be checked by actual measurements.

A most peculiar feature of the structures is what appear to be triangular shaped corbelled holes through most of the walls just above the floor level. Dr. Jansen has informed me that some of these are modern creations intended by the conservators of the site to promote drainage. But some of them must be ancient. I have found two published references to similar apertures at Mohenjodaro and none at other Harappan sites. The first example is in Room 78 of House XIII in VS Area (Marshall 1931: 20-21, 219, Pl. VI and LV, b) where it looks like a crawl-hole about a meter high and just wide enough for a man to pass through. It is completely blocked with brickwork and Marshall suggests that it belonged to an earlier building level.[3] The second example is seen in House V, Block 2 of HR Area, Section B, between Rooms 49 and 54 (Marshall 1931: 190, Pl. LIV, b). It appears to have been a corbelled doorway, eight feet four inches high and two feet five inches wide, but it also is completely blocked with brick-work.[4] It is curious that this presumed doorway is almost identical in construction and dimensions with the famous corbelled drain associated with the Great Bath (Marshall 1931: 134, Pl. XXII-XXIV).[5] Whether this is a mere coincidence, related somehow to the Harappan's limited knowledge of constructing arches or whether there is something fundamental about the functions of these two passageways which is not clearly understood, requires further investigation.

Another peculiar architectural feature at the Moneer Site is an apparent modification of the well known, ubiquitous bathing (or ablution) floors with their finely constructed brick floor and drains. These are common at most other parts of Mohenjodaro but at the Moneer Site they have an interesting added feature. Outside one wall of these washrooms there is usually a small flight of brick steps. They are so arranged that they could provide an easy means for a servant, or member of the family, to pour water on the bather, thus making these more like shower rooms rather than ordinary washrooms. A perusal of Marshall's and Mackay's Mohenjodaro reports, and those of other Indus Civilization sites, turned up very few similar arrangements and for none of them have the excavators suggested whether the steps were used for any purpose other than gaining access to a presumed second story. At Harappa, for example, only a few bath floors are reported (Vats 1940: 21, Pl. III) and they are located, oddly enough, in the central aisle bisecting the granary. The plan shows clearly that one of these bathing floors has a small set of steps constructed directly next to it.

The Mohenjodaro publications indicate only six locations where wash floors and steps are associated. Three of these are in the Lower Town and three are in the SD Area on the Stupa Mound. The clearest examples of wash floor with steps combinations are seen in the remarkable series of eight chambers in Area SD, Block 6, north of the Great Bath (Mackay 1938: 18-20, Pl. III, b and d). These are unique in having the flights of steps constructed inside one corner of the washroom itself. Mackay interprets the room as ablution chambers above which the priests lived. The steps were used merely for getting to the second story. Without any direct knowledge of the ancient religious beliefs and practices of the Harappans it is meaningless to attempt to refute this, or any other interpretation, but the evidence from similar structures at other parts of Mohenjodaro suggests to me a purpose for the steps more directly related to the function of the bathing floors themselves.

In Block 2 of the SD Area, south of the stupa, another exceptionally well-built bathroom is described (Marshall 1931: 147, PI. XXVII, XXVIII, b). The excavator notes that "this bath, which is situated a little below the level of the surrounding rooms, was entered from above by a short stairway in its southeastern corner...." Given the incredible complexity of the architectural remains at Mohenjodaro, it is just as reasonable to suggest that this bathroom with its steps belongs to the floor level of an earlier structure. The third bathroom is seen in Room 5, Block 5 of the SD Area south of the stupa (Marshall 1931: 149, Pl. XXVII). Nothing is mentioned in Marshall's text but the plan of the area shows clearly a set of steps at the northwest corner of the wash floor.

In the Lower Town, DK Area, G Section (northern portion), Block 23, House III, Room 15 (Mackay 1939: 155-56, Pl. XIII, XXII, 1) a flight of steps, with four remaining treads, is seen at the east side of a paved wash floor. Mackay describes the room as a "privy" and suggests that the steps "probably led up to a privy of the next phase." Marshall describes a similar situation in House VIII, HR Area, Section A (Marshall 1931: 18-19, Pl. IV, V, a) where a bath floor has a set of steps leading up directly from it. He explains the steps as leading up to a later building level and sees no direct connection between them and the wash floor. In House LIII, Block 7, B Section of the HR Area, Marshall describes another possibly related bathing complex where in the portico of the house there is a staircase "the tiny chamber under which may have done duty as a privy" (Marshall 1931: 209, Pl. XXXIX).

It is possible that a careful examination of the numerous examples of wash floor-steps combinations in the Moneer Site may help elucidate this aspect of daily life at Mohenjodaro.

Thus, it seems, the Moneer Site may provide significant new insights into the living arrangements and practices of the Mohenjodaroans. The apparent differences in architectural detail with the other excavated parts of the city may be temporal, or more important if true, they may reflect some degree of socioeconomic stratification in the population not noticed in the other excavated parts of the city.

Dr. Jansen will make a detailed survey of the Moneer Site which will be an especially important aspect of his long-range project to document fully the architectural remains of Mohenjodaro. With the present moratorium on new excavations at the site and the ceaseless battle between the forces of natural deterioration and the efforts to preserve and reconstruct the remains, Jansen's documentation project takes on special importance. It is, under the present circumstances, the only way to learn significant new information that was overlooked, unrecorded or unpublished in the earlier excavations.

Adjunct to Dr. Jansen's project is the research of Dr. Anna Sarcina of Torino, Italy, who has completed an important study of the domestic architecture of Mohenjodaro (Sarcina 1979). Her analysis of different house types will be published in the journal *Mesopotamia.* It is hoped that her theoretical scheme can be tested in the field as part of Jansen's architectural project.

As for other new information and re-evaluations of old data, I wish to mention a few of the points concerning us now as we are preparing the final reports on the University Museum (Philadelphia) excavations along the western edge of HR Area.[6]

The first volume under preparation is devoted to the pottery. The ceramics are being classified and described according to the system developed during our recent four-year project at Balakot, Pakistan (Dales, 1974, 1979). The approach differs from other classifications and descriptions of Indus ceramics in that we are treating the material holistically as an integrated industry—a major industry at Mohenjodaro involving complex technological skills and aesthetic preferences not treated in detail in earlier reports. A number of distinctive manufacturing techniques, not recognized in earlier studies, set off the Harappan industry as something quite different from contemporaneous industries in neighboring regions. The more complete and detailed publication of the full range of vessel forms and surface decorations will help abrogate statements about the "unimaginative and unadventurous" character of Indus ceramics. There is no question as to the high degree of standardization and the mass production aspect of the industry, but a closer look at it gives a better appreciation of its sophistication and variability.

One of the problems that has led to the impression of monotony and dull uniformity in the Mohenjodaro ceramic industry is that few of the earlier studies could treat the material with much temporal perspective. As Sir Mortimer Wheeler put it, the so-called uniformity of the pottery, and of the civilization as a whole, is due as much to "archaic methods of research as to any inherent conservatism in the ancient craftsmen" (Wheeler 1968: 94). This problem will be dealt with specifically in our Mohenjodaro reports, thanks partly to the fortuitous discovery of some of the long-forgotten records of Wheeler's 1950 excavations on the Citadel Mound.

I was fortunate in 1976, during a sabbatical leave in England, to learn of the location of some of these important unpublished records. The British Academy and Professor Raymond Allchin put me on to Professor Leslie Alcock at the University of Glasgow who had been Wheeler's principal assistant during the 1950 excavations. He had in his possession the drawings and descriptions of the pottery from the excavations at the so-called Granary and Fortifications. After Sir Mortimer's personal involvement in Mohenjodaro had waned, the excavation records were stored and virtually forgotten. Some of them at least, are now being rediscovered and the sad occasion of Sir Mortimer's death has rekindled interest in his important work at Mohenjodaro. Professor Alcock has generously agreed to collaborate on a joint volume including the pottery from both the University of Pennsylvania and Wheeler's excavations. The 25-year-old drawings had to be completely redone[7] and Professor Alcock has updated and partially revised the catalog and text. This provides an excellent opportunity to study fairly long sequences of ceramic development from functionally different parts of the site. The Wheeler pottery will be presented in four groupings with the earliest coming from his deep sounding just to the west of the "Granary" (his Site REM) and the latest coming from the "Fortifications" (his Site ACC) at the southeastern corner of the Citadel Mound. The volume will provide a small but hopefully significant tribute to Wheeler's own work at Mohenjodaro and to the enthusiasm and support he so persuasively offered others to continue research on the Indus Civilization.

One interesting result of our study of the ceramics from the University Museum excavations is the identifying of apparently non-Harappan pottery in the upper Harappan levels. Especially significant is the presence of Jhukar-style pottery similar to that described from the earlier excavations at Jhukar (Majumdar 1934: 5-11), Chanhudaro (Mackay 1943), and Amri (Casal 1964). We have at least a dozen examples of stylistically non-Harappan painted pottery from well-stratified Harappan contexts, several of which are identical to published examples of the Jhukar-style pottery.[8]

There is corroborative evidence from other sites in Pakistan that the usually assumed Post-Harappan position of Jhukar is questionable. To be sure, at Chanhudaro, the excavator states that the Jhukar occupation was separated from the latest Harappan by several centuries, but elsewhere he mentions that the Jhukar people sometimes reoccupied Harappan dwellings. Mackay appears to have been puzzled by the Jhukar presence. On the one hand he stresses the radical difference between the Jhukar painted pottery and that of the Harappans (Mackay 1943: 25) but on the other hand he emphasizes the continuity between the two cultures.

> If we were not so well acquainted with the craftsmanship of the peoples of the Harappa culture as it is exemplified at Mohenjodaro and Harappa, we might have found it difficult to distinguish between the products of the Jhukar people and those of the Harappan people in the Chanhudaro mound (Mackay 1943: ix).

At Amri, Casal postulated a Period III-D Jhukar, but states that no actual archaeological strata of this phase have been found in the excavations. He sees Jhukar as a late manifestation of Harappan rather than as a new cultural successor.

At Jhukar itself, new excavations by the Pakistan Department of Archaeology from 1972 through 1974[9] discount the interpretation of Jhukar being temporarily and culturally distinct from Harappan. The results of the excavations have not been published but they were discussed in detail at the International Symposium on the Indus Civilization held in Karachi in January 1979. There Dr. Mughal firmly stated his impression that Jhukar is nothing more than a pottery style that occurs archaeologically with Mature and Late Harappan and not after it and that it has much in common with the Harappan ceramics. This may be overstated but even so it is based on direct observation of the excavations at Jhukar and first-hand study of all the ceramics. At the very least, these new excavations corroborate the evidence from Mohenjodaro that there is no significant temporal separation between Jhukar and Harappan.

Part of the dilemma over Jhukar results from the selective manner in which the evidence has been published with the emphasis on the spectacular and the unique, especially with the painted decorations. The recent excavations at Jhukar provide the opportunity for the study of the complete ceramic industry including the more numerous examples of unpainted types. Provisionally it seems clear that Jhukar pottery has some typological and stylistic connections with the Harappan but that it definitely was manufactured separately, and has its own distinctive repertory of basic forms (implying a degree of functional differentiation from Harappan ceramics), and its own level of technological competency.

A recent study of the Chanhudaro pottery in the Boston Museum of Fine Arts by Berkeley graduate student Jonathan Mark Kenoyer makes it clear that the Jhukar pottery is readily identifiable because of its distinctive vegetable-tempered paste, its thin red matte slips, its painted decorations in purplish-brown to black, and its generally crude craftsmanship. And, with the exception of the dish-on-stand form, the Chanhudaro Jhukar pottery is quite different from the Harappan forms.

The implication is that what one usually calls Jhukar is not Post-Harappan and may instead be a manifestation of interaction between the Urban Harappans and a closely allied, but culturally differentiated, group of peoples living locally in northern and central Sind. An analogy might be suggested with the Kulli-Harappan symbiosis wherein one sees a geographically peripheral population interacting peacefully with the Harappans, perhaps imitating certain Harappan forms and styles and, at Balakot, Nindowari and other sites having a physical presence in the Harappan settlements, all the while retaining its basic cultural identity. A scenario such as this seems reasonable, else one is forced to postulate a Harappanization of the entire Indus Valley and much of Baluchistan—an unlikely possibility, as unrealistic as talking about the total Indianization of South and Southeast Asia.

Just how closely, if at all, related the Jhukar phenomenon is to the decline and devolution of the Mature Harappan is unknown in cultural and historical terms. But temporarily, to judge from the archaeological evidence, Jhukar is not the Post-Harappan development it was once thought to represent.

Walter Fairservis in his earlier study (1975: 353) agrees with this general assessment of the chronological, historical and cultural position of Jhukar. The Allchins, on the other hand (1968: 145-47), see Jhukar as a Post-Harappan continuation of local traditions, carried on by the local survivors of the barbarian invasions (Aryan) that overwhelmed the Harappans. Now in the face of collective evidence from the various sites where Jhukar material is found, this must be regarded as a minority opinion. Any final verdict depends first of all on the full publication of the recently excavated material from Jhukar itself.

The major, and controlling, factor in the University Museum excavations is the stratigraphic and chronological sequence of the architecture and depositional remains. Any architectural and stratigraphic discussion of Mohenjodaro is difficult, even under the best of circumstances. The 1964-65 excavations were not conducted under the best of circumstances and the post-excavation work was saddened and curtailed by the untimely death of our architect Aubrey Trik. The preliminary reports described how the excavations were conducted along the western edge of the HR Area (Fig. 8.1). One curtailed season of excavation was completed before the government moratorium on new work was imposed. While many significant new discoveries were made (Fig. 8.2) it has been difficult to assess them as fully as would be desirable. Especially serious is that some crucial details of relative stratigraphy were not worked out during that single season. It was not until the winter of 1978-79 that the opportunity was afforded to return to the site with experienced architects to complete the recording of the excavations. Dr. Michael Jansen and Mr. Jurgen Philips of Aachen, West Germany,[10] worked with me to retrieve as many of the surviving unrecorded architectural and stratigraphic details as possible. The final plans, elevations, and sections are now being prepared.

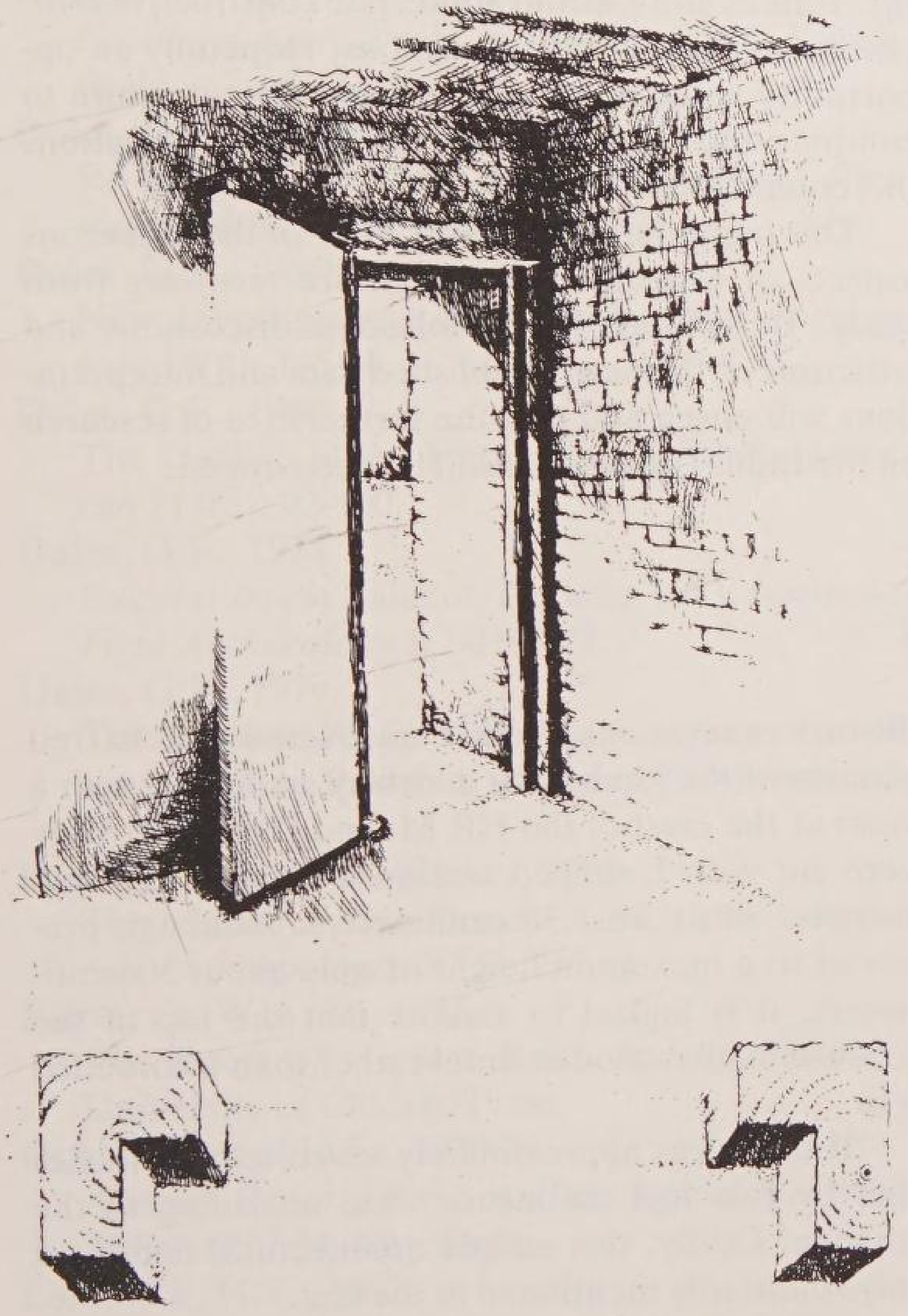

Fig. 8.2. Remains of wooden door jambs and reconstruction of doorway. University of Pennsylvania excavations, 1964–65.

The opportunity to work again with these long-neglected records allowed for considerable reassessment of the nature and significance of the architectural features uncovered. Jansen and Philips have provided essential insights into some of the main interpretative problems. One of the principal advances in one's understanding concerns the massive fired brick wall uncovered at the base of the mound at present ground level. In the heat of discovery, I—to paraphrase Sir Mortimer—"lightheartedly suggested" that the City Wall of the Lower Town had been discovered. This solid brick wall, some two meters thick and more than ten meters high, is actually but a segment of other massive and complex architectural features delineating the eastern side of a wide street. This street, which can be traced for a couple hundred meters, is almost identical in dimensions and orientation to the famous First Street that runs north-south through the DK, VS and HR Areas. Fragmentary remains of fired brick structures, directly at or just below present plain level, form the western side of this street. This provides further substantiation that at least the main traffic arteries of the city were intentionally planned and laid out in a systematic manner.

The presence of this major street along the present base of the Lower Town does not obviate another suggestion made in our preliminary reports that a canal or branch of the river bisected the city plan. One of the deep borings made in 1965 in the low empty area between the Lower Town and the Citadel Mound revealed the presence of only water-laid deposits from the surface down some 40 feet to virgin soil. This suggestion of a canal having run through the city goes back to the earliest excavators. Mackay (1938: 4) mentioned the excavations of R.D. Banerji (never published) at Site Three to the northeast of the Stupa Mound which appeared to be constructed as a small fort or a landing-loading platform for small boats. Further work at Site Three and along the edges of the mounds bordering this assumed canal should have high priority if excavations are ever permitted to resume.

To return to the architectural discoveries made in 1964-65: descriptions have been provided in the preliminary reports of the gigantic mud-brick platform that dominates that section of the western edge of the Lower Town. This, and the large fired brick wall that provides a facing for the platform, substantiate the abundant evidence from other parts of Mohenjodaro that it was necessary for the inhabitants to raise the occupation level constantly as defense against floods. As for the existence of a formal city wall it is best to stick with the interpretation offered by Sir Mortimer that "For the present it would be premature to conjecture that the Lower City was fortified in a military sense, though it is increasingly clear that massive flood-defences were undertaken" (Wheeler 1968: 47).

Certainly the currently most debated—but not debatable—phenomenon concerning the life and destiny of Mohenjodaro is that of the nature and extent of flooding. Contrary to some prevailing opinions, the Mohenjodaro floods were not invented by Mr. Robert L. Raikes and myself in 1964. Not a single excavator or serious student of Mohenjodaro has denied the presence of massive disruptive floods throughout the history of the city. There is, however, disagreement over the cause and nature of these floods. This is the problem that Mr. Raikes originally focused on and on which we collaborated during the University Museum excavations (Raikes 1964, 1965; Raikes and Dales 1977; Dales and Raikes 1968).

Despite some serious, and often well-reasoned objections to the Raikes hypothesis (Possehl 1967; Lambrick 1967; and others) it is still, given the admittedly small amount of scientifically-collected evidence, the only hypothesis that accounts for the complex multifarious anomalies involved. The most recent statement on the issues and problems involved has been published by Raikes and myself (1977) in the *Journal of the Palaeontological Society of India.* Mr. Raikes and I would appreciate constructive criticism, comments, and suggestions. Hopefully an opportunity will come in the not too distant future to continue and expand the scientific field investigations this crucial problem deserves.

This paper has focused on a few of the numerous aspects of Mohenjodaro which are receiving fresh study. It is hoped that wholesome discussions and criticisms of the newly published data and interpretations will ensue and that the furtherance of research on the Indus Civilization will be encouraged.

NOTES

[1] This has been imposed by the Government of Pakistan to allow all of the limited resources to be directed toward the staggering job of conservation and preservation of the already excavated remains.

[2] It is unfortunate that this detailed plan was not the one published in the *Master Plan for the Preservation of Mohenjodaro* or in other official publications of the project. All these publications have used the incomplete plan published by Mackay in 1938. The aerial photographs were taken sometime between February 1965 and the publishing of the UNESCO map in 1968 because they show the 1964-65 excavations of the University Museum.

[3] The reconstruction drawing of Hall 76 of this same building (Marshall 1931: Pl. LXIII) shows four corbelled niches in the north wall. Actually the corbelling was only conjectured by Marshall. Indeed Mackay thought these were vertical chutes extending up to the roof to provide fresh air circulation. At any rate, the niches do not pierce the wall and apparently are unrelated to the enigmatic corbelled apertures under discussion.

[4] Little evidence survives at Mohenjodaro for the construction of doorways. We were fortunate in our 1964-65 excavations to have uncovered the charred remains of the jambs of a doorway associated with a room at the crest of the HR Mound (Fig. 8.2). They were cut with L-shaped section from logs having a diameter of at least 30 centimeters. Although preserved to a maximum height of only about 30 centimeters, it is logical to assume that the top of the doorway had a wooden lintel rather than a corbelled arch.

[5] It measures approximately seven feet six inches high by two feet six inches wide according to the drawing. Oddly, this unique architectural feature is only summarily mentioned in the text.

[6] To be terminologically consistent with the earlier excavation reports, this should be called the DL or DS Area but I prefer to call it the UMP Area.

[7] I wish here to acknowledge the weeks of work volunteered to this task by my wife, Barbara.

[8] I thank Dr. M. Rafique Mughal for helping with these identifications.

[9] Directed by Gulzar Mohammed, 1972-73 and by M. Rafique Mughal and Gulzar Mohammed in 1973-74.

[10] Jansen is with the Department of History of

Architecture and Architectural Preservation, and Philips is with the Geodatisches Institut, both at the Rheinisch-Westfalische Technische Hochschule, Aachen, West Germany. The field study at Mohenjodaro was supported by a grant from the Smithsonian Foreign Currency Program.

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WALTER A. FAIRSERVIS, JR.

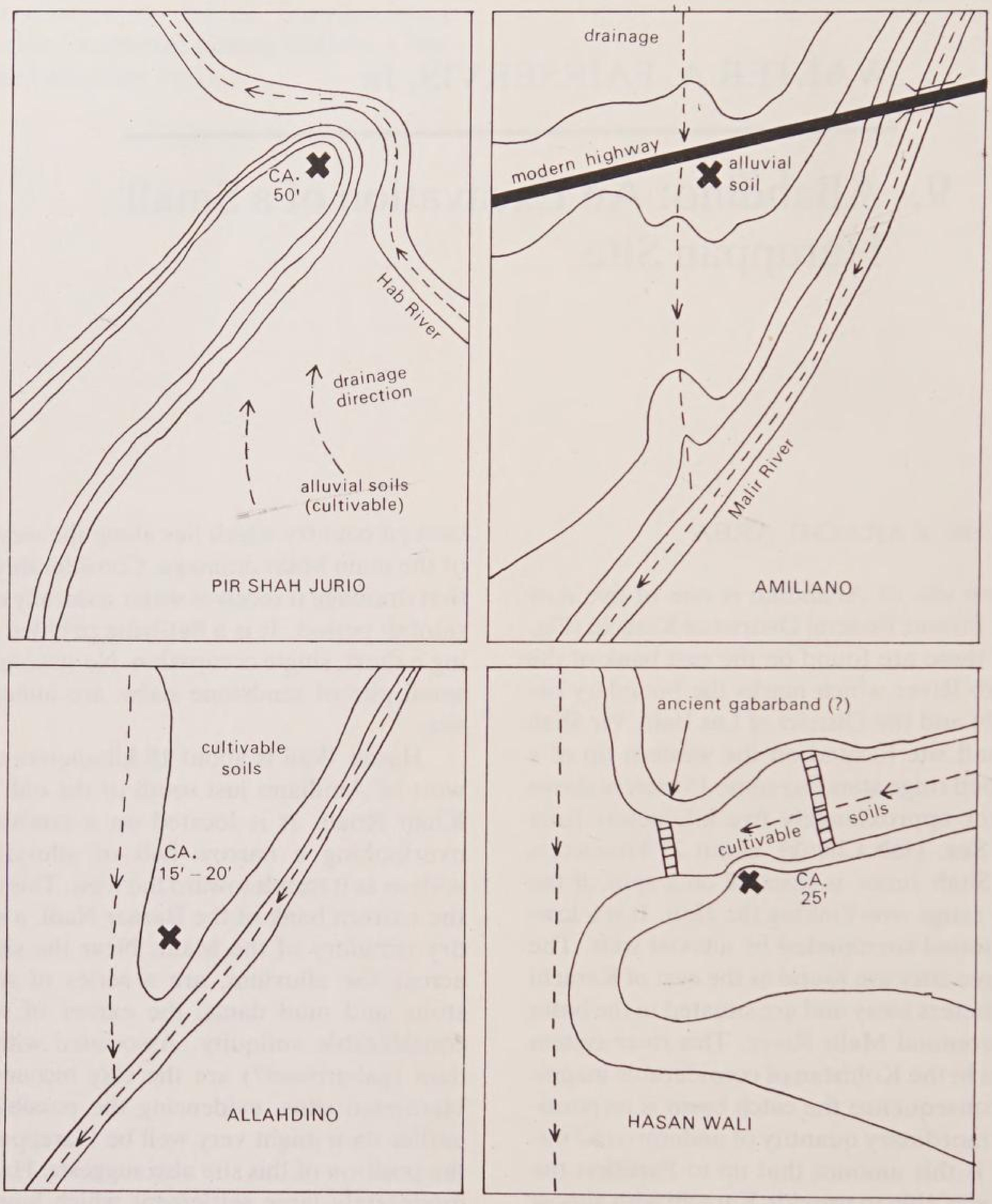
9. Allahdino: An Excavation of a Small Harappan Site

SITES IN THE KARACHI AREA

THE Harappan site of Allahdino is one of five now known in the former Federal District of Karachi (Fig. 9.1). Two of these are found on the east bank of the perennial Hab River which marks the boundary between Karachi and the District of Las Bela. Pir Shah Jurio is a small site located on the western tip of a crescent-shaped ridge standing some 15 meters above the Hab River approximately five kilometers from the Arabian Sea. Hab Chauki, about 23 kilometers north of Pir Shah Jurio, is situated on a spur of the Lyari border range overlooking the Hab. It is a low-lying small mound surrounded by alluvial soils. The remaining three sites are found to the east of Karachi some 35 kilometers away and are situated in the basin of the semiperennial Malir River. This river system drains an area in the Kohistan of considerable magnitude and in consequence the catch basin is responsible for an extraordinary quantity of underground water. So great is this amount that up to Partition the Malir system was able to provide Karachi with almost two-thirds of its water supply. Pumping of this water provides irrigation water for the Damlotti and Malir agricultural developments—the most prosperous ones locally. The water table is found in the Malir area at about 15 meters, rising in wells to about six meters below the surface in a good year. The Malir River in flood season is a formidable stream and capable of regularly filling local reservoirs.

The site of Amiliano was discovered by Majumdar in 1934. It is located in a pocket of soil found in the broken country which lies along the western borders of the main Malir drainage. Considerably higher than that drainage it receives water naturally only during a rainfall period. It is a flat-lying pebbled site suggesting a short, single occupation. No structures, except a small pile of sandstone slabs, are indicated for this site.

Hasan Wali is about 15 kilometers to the southwest of Amiliano just south of the old Thano Bulla Khan Road. It is located on a sandstone outcrop overlooking a narrow belt of alluvial soil which widens as it trends toward the west. This terminates at the eastern bank of the Bazaar Nadi, a small usually dry tributary of the Malir. Near the site, and lying across the alluvium, are a series of superimposed stone and mud dams, the earlier of which are of considerable antiquity. Associated with the earlier dam (gabarbund?) are the clay bicones familiar at Harappan sites, evidencing the possibility that the earlier dam might very well be Harappan, as indeed the position of this site also suggests. Hasan Wali is a moderately large settlement which fans out from a high point with a central stone structure that immediately overlooks the alluvium. Stone walls run in a number of directions showing that buildings with stone foundations were characteristic of the site. Considerable deflation has taken place owing to the site's exposed position; but all the evidence suggests that ancient occupation was short and for one period only. Plans have been drawn of the exposed structures and will be included in the overall Allahdino report.


Relationship of Four Harappan Sites of the Karachi Region to Cultivable Soils and Water

CA. 50'
Hab River
drainage direction
alluvial soils (cultivable)
PIR SHAH JURIO
drainage
modern highway
alluvial soil
Malir River
AMILIANO
cultivable soils
CA. 15' – 20'
ALLAHDINO
ancient gabarband (?)
cultivable soils
CA. 25'
HASAN WALI

Fig. 9.1. Sites and drainage patterns in the Karachi region.

ALLAHDINO

Allahdino is a low silt mound rising about two meters above the modern alluvium. The site extends no more than 100 meters in any direction. Its position is in the midst of modern cultivation, three to five meters above the present flood plain of the Malir River and that of its tributary the Bazaar Nadi. Allahdino is close to the junction of the present beds of these streams and is about 15 kilometers south of Amiliano. Of the five Harappan sites of the Karachi region, Allahdino offers the most promise of excavation return. It is in a relatively protected situation and its size promotes the possibility that a reasonable sample can be taken. It is also important in that its position within the modern alluvium is in striking contrast to the other sites. Pir Shah Jurio and Hasan Wali are above and outside the cultivable alluvium. Hab Chauki and Amiliano are in the midst of very small pockets of cultivable alluvium but are to a degree isolated from the more important tracts of cultivable land in the region. Only Allahdino's location indicates the man/land relationship emphasized at Mohenjodaro, Harappa, and other riverine-oriented sites.

The study of these Karachi District sites is important for several reasons. First, it will reveal much about the Harappan Civilization's internal character. Also, the sites stand at an intermediate position between Baluchistan and Sind and are close to the traditional sea and overland trade routes which converge on the Karachi area. It is hardly likely that if extensive commerce moved along these routes in the Harappan times that the sites of the Karachi region would not reflect its influence in some way or another.

The excavation strategy at Allahdino was to clear one level as completely as possible. It is known of course that non-Harappan, or Early Harappan, sites of Amrian type occur in the region (Orangi, Hasan Wali II, and sites along the Hab River for example) and it would not be unexpected given the situation elsewhere to find Amrian material in the lower levels at Allahdino. Though in actual fact one did not, this possibility seemed far less important than an effort to reveal the character of Harappan occupation at one level; something surely needed in the study of the Indus Civilization. Allahdino's size also makes possible the excavation of the entire site, thus ensuring the recovery of a "complete" sample. It has been growing clearer and clearer that excavations on parts of sites of a given period do not, as a rule, produce sufficient evidence by which to truly assess cultural character. However statistically valid a random sampling might be, it is suspect when one has to deal with most human activities as the history of sociology evidences. In order to handle this problem a quantitative method was adopted which required that all excavated earth be screened and that a rigorous control over fragmentary material be exercised. Even thumbnail-size copper stains *in situ* were recorded as if they were actual objects. After three-and-a-half seasons of work the amount of recovered material is impressive: more than 300,000 potsherds, 24,000 bicones, 2,600 terracotta triangles, 1,500 bangles, 196 pieces of copper or bronze, etc. The same technique was of course maintained for faunal material, slag, exotic unused stone and the like. Flotation and soil analysis were carried out as well. All material was recorded in the same way, *in situ* or in fill. This helps create a distributional picture where, for example, the density of artifact or non-artifactual material may serve as an indicator of specific functional locations. It also gives an opportunity to test the validity of random sampling in the archaeology of the borderlands, wherever it occurs. At least one more full season at Allahdino is planned, however, before this can be done.

ARCHITECTURE

At the central, highest part of the site, an open court measuring approximately 20 meters by eight meters was uncovered. The most distinctive feature of this court is a stone-built well (Well A) in the middle of the southern wall. The well has a small opening (ca. 60 by 90 centimeters) and a Harappan intersecting circle "bath tub" was attached to its southern side. This well stood at least 1.25 meters higher than a surrounding pavement which at one phase of the site's existence probably covered the entire court. The well, however, appears to have been a part of rectangular Building IV. South of Building IV is a complex of small rooms which is temporarily called Building VII. This is apparently joined to Building IV by another and similar well (Well B). Building VII has a broad brick platform with two square pits and a third rectangular in plan. There are also stone walls and rooms along its southern margin. In one of these rooms a small pot was found *in situ* which contained a jewelry cache of five necklaces and eleven copper finger rings of coiled wire. The necklaces had silver beads (both barrelform and disc) as well as carnelian, agate, jasper and copper beads and spacers. A tiny gold earring was also found in this cache.

Access to the central court was made possible through open passageways left between the surrounding buildings. Of these, Buildings I and II are the most impressive. Building I, the largest on the site, is still not completely excavated and in its latest phase may have been modified from an earlier, still poorly defined building. It appears to have been characterized by two east-west running wings joined by a platform and drain complex on the east and by a stone wall complex on the west. The latter is only partially excavated. The whole centered around an inner court in which there may have been some subsidiary (or earlier) structures. The northern wing was made up of compartments, the western half of which contained storage vessels, including a fine classic Harappan black on red vessel similar to the one shown in the famous frontispiece of Mackey's publication on Chanhudaro. There is some suggestion that access to these compartments was via some stone steps.

Building II contained a stone-lined bathroom complete with covered drains, and outlets to the north. Between Buildings I and II there are remnants of a paving which is presumed to have been joined to the paving of the central court at a late phase of the site's existence. Most striking is the presence of a drain system represented by two stone-lined channels which join to the south at the head of the alley between Buildings I and II. A large stone slab, still in place, was apparently used to direct water from one channel to the other.

Building III, at the western end of the central court, appears to have been used for the manufacture of clay bicones and other baked clay objects. It contained clear evidence for ovens in compartments in both its northwestern and southeastern sections. Building V appears to have been used as a "warehouse" of some kind since large storage vessels were found there. But, it also contained considerable habitation debris. Building VI is still unexcavated but a line of stone wells suggests a separate structure.

Certain features of this complex of buildings at Allahdino can be noted.

1) All the buildings have some portion of their structure in stone.

2) There appears to be no regular pattern of brick laying: header-header, stretcher-stretcher, and header-stretcher bonding all occur, even in the same building.

3) There are functional differences among the structures.

4) There is a formality of plan which integrates the structures. There is a general absence of haphazardness both in the way the buildings were constructed and the way they relate one to another.

5) The thickness of walls in Buildings I, II and probably III, as well as the smallness of many of the "rooms" in these structures, argues for a second story in at least some of these buildings.

6) There was no perimeter, or enclosing wall around the site.

IRRIGATION

One of the most intriguing problems which Allahdino raises, and perhaps solves, is the question of the smallness of the openings in the two wells. Well A was traced to a depth of about 4.3 meters or some 1.25 meters into the virgin soil before the stone construction stopped. Clearly the well builders had a special purpose for this kind of construction. What was this?

As outlined earlier, the immense catch basin of the Malir system produces a large underground reservoir. The modern open pump wells, some of which are 30 meters or more across, fluctuate seasonally according to the amount of water in the reservoir. However, as is well known, water in wells rises higher than the surrounding water table because of hydrostatic pressure. The smaller the well diameter the higher the water will rise. Modern wells in the Damlotti area fluctuate in water height as much as 10 meters or more. Even in the larger wells the water surface may reach to within six meters of the modern land surface.

It is suggested then that the Harappan wells were deliberately kept small in diameter so that the water level would not only rise higher but would indeed *overflow* in artesian fashion. The well openings are certainly too small to conveniently lower containers through them. But there is another important factor. The central well is located at the highest part of the site. Any runoff from that well could be channeled wherever one wished because of the slope of the surrounding site. In the case of the divided drain to the north, a regular flow of well water could be moved with precision through the stone channels into the surrounding fields via earth-cut ditches; again *because of the slope of the site itself.* In the modern situation well water is pumped out onto a platform above the surrounding fields and guided into those fields by a channel which slopes down from the platform. The neatness of this idea in the Allahdino case is that it accounts for the narrowness of the well, the strategic location of the well at the top of the site, and the bifurcation of the drains with their movable sluice block. It also makes site location understandable. Since Allahdino is five or more meters above the Malir River, water for the cultivation of the surrounding alluvium must be brought to the fields in some regular fashion. Alternatives to meet this need are not attractive. One could hypothesize an irrigation canal which takes off from a contour above Allahdino; but this would mean a canal at least 20 to 25 kilometers long. One could argue for greater rainfall, which may be valid; but for which the evidence at

Allahdino is at least still uncertain. One could postulate the regular use of some water-raising devices, like the *shaduf* or the Persian Wheel; but there is no evidence for these. On the face of it I believe that the argument as outlined above for well-water irrigation is plausible. An additional observation might be added that immediately north of Allahdino the slope of the land is from east to west, or across the greatest extent of cultivable land.

OTHER CONSIDERATIONS

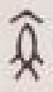
The stratigraphy of the site leans heavily upon the work of Jim Shaffer who cut a sondage in quadrant J-6. It appears that there was an early phase when Harappan cattle pastoralists settled the site. This was followed by a major construction period during which Buildings I, II, III and probably IV, were created. These were embellished somewhat later by the addition of the more flimsy structures on the south. None of the buildings, however, remained static during its life as all of them have indications of rebuilding and wall modification as one might expect in the life of any structure. The site was abandoned suddenly as the jewelry cache and the basically intact walls of the various buildings suggest. Apparently the collapse of the superstructure did much to preserve the foundations and the contents of many of the rooms. Later visitors to the place left little evidence for their passing except some burned spots which marked their fires and an occasional line of postholes, such as in plan of Building II, quadrant G-5, and Building I, quadrant F-4. The conformity and continuity of artifacts and structures evidences a short time span for Harappan occupation which I suspect was no more than a hundred years at the most.

The scale of the site is modest and the fact that several of the structures are specifically functional rather than generally habitational, as well as the possibility of an irrigational premise as outlined above, gives the impression that the population living on the site was no more than eighty or so. One suspects numerous scattered households were satellite to sites like Allahdino and Hasan Wali. In turn these sites served the extended community by providing collective labor for functions such as milling, irrigation, religious services, administration, storage, etc.

ARTIFACTS

An ongoing study of the interior diameter of fragments of clay bangles has indicated so far that the hand breadth of the bangle wearers was about five centimeters. This evidence suggests that the women who are presumed to have worn them were very slender and perhaps under five feet four inches in height.

There is evidence for cattle, goats and sheep, the water buffalo, possibly the donkey, and for grain-eating rodents. There were also gallinaceous fowl, as well as fish and possibly the monitor lizard. Flotation results have not been truly satisfactory. Wheat, and perhaps barley, is attested and a legume of some unidentifiable kind was found; but nothing else has been isolated. One hopes to improve on this by utilizing newer flotation methods in a subsequent season.

The seals and graffiti attest to the fact that not only was the Harappan script well known to the inhabitants of Allahdino, but that the social organization for which the seals are representative was in vogue there. There are "unicorn" bull seals, and both the elephant and the rhinoceros. If, as I have discussed in the first preliminary report for Allahdino (Fairservis 1976), these larger motifs in the seals generally represent sodalities in the society, it is clear that the Allahdino settlement was highly organized under a leadership familiar on a larger scale at Mohenjodaro and elsewhere. In the same context, the repetition of the capped knot sign  on sealing 73-156, and on three unicorn bullseals 73-105, 73-32, and 74-177, which I would read as settlement chief (*urtal*), is not at variance with the sense that the polity of the Harappans revolved around shared and specialized authority as is not uncommon in later manifestations of village India.

TRADE

If one draws a series of concentric circles representing 10 kilometer units with Allahdino at their center it can be said that 95 percent of all materials found on the site could have been obtained within 50 kilometers. Flint deposits have been located within seven kilometers of Allahdino. Shell and fish are obtainable both in the Malir Basin and the coast of the Arabian Sea. Copper, agate, jasper and carnelian are found in the Lyari Hills, the Porali Basin, the Kohistan, and the Hab River Valley. On estimate, about 10 kilograms of copper artifacts were found at Allahdino. Only the gold and silver are not locally obtainable among all the materials that have been identified.

However, until qualitative analysis of these materials is completed one cannot exclude the possibility that at least some of the manufactured articles are the consequence of trade. While copper slag is attested at Allahdino it is scattered and sparse and no furnace has yet been found there. However, it is doubtful on the face of the overall evidence that trade was significant either in the location of the site or deeply involved in its functions.

SUMMARY

Allahdino, and by allusion the other Malir sites, was a settlement created to serve a community whose population was resident in households scattered over the landscape and presumed to be largely engaged in agriculture and cattle pastoralism. Ancient Allahdino provided various functions including local administration, the manufacture of clay artifacts and irrigation water. The households were probably no more than three kilometers from the central site and a constant interplay between Allahdino and the household was maintained. Local natural resources were sufficient for most material needs and specialists living at Allahdino both obtained and converted these materials. Interaction among the Malir, and with other Harappan sites of the region, moved objects and services through a network which is characteristic of Harappan settlement almost everywhere. Ultimately, regional networks connect with one another reinforcing both the conformity of Harappan Culture and its continuity even far from the Indus River Valley itself. This is a model which hopefully one can continue to test as work is finalized at Allahdino.

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R.S. BISHT

10. Excavations at Banawali: 1974-77

INTRODUCTION

THE excavations at Banawali (lat. 29°37′5″ north; long. 75°23′6″ east) in Hissar District, Haryana, during the four seasons 1974-77, have revealed a threefold cultural sequence; Pre-Indus, Indus and Post-Indus. This material is important in assessing the role played by the Pre-Indus Culture during the Mature Indus times and thereafter. It also places more light on the tangled mass of Chalcolithic materials gathered in Haryana and the Punjab, besides adding a new Pre-Indus settlement and another Indus fort-town in the eastern part of the valley of the "lost" Sarasvati. Over the last six decades the consistent efforts of a number of field workers have led to the gathering of a good deal of archaeological data bearing on the protohistory of the Subcontinent and the neighboring countries of Iran, Afghanistan, the U.S.S.R. and in the Persian Gulf. Needless to say, the most spectacular discovery so far relates to the phenomenal emergence and spread of the Indus Culture which as yet stands in majestic isolation, evading precise clues as to its ancestry and progeny. But, like all preceding and succeeding cultures, it still remains nameless, despite the claims of India and Iran to a long and most ancient literary tradition. No archaeological materials have so far been conclusively associated with the Vedic, Avestan, or, for that matter, with the Epic Age. Nor can any of the Pre-Indus, Post-Indus, or Early Iron Age cultures be convincingly identified with any age or phase known in literature. Therefore, conclusions on the history of Pre-Buddhist times are exceedingly difficult to arrive at and are often debatable.

Before turning to Banawali, it is appropriate to say something about Haryana and its special role in this story. Geographically, Haryana forms a part of the Indo-Gangetic Divide and partakes of river systems of both the Indus and the Ganges. Furthermore, it is the natural and most convenient corridor between these two valleys, both of which are circumscribed by strong geographical barriers. The Indus Valley forms a great triangle. The rugged and inhospitable mountain ranges of the Kirthar and Sulaiman, which have always allowed successive groups of peoples through their narrow passes, stretch as the baseline along the west. The formidable Himalayas lie as the northeastern arm. On the south the Arabian Sea bounds the valley. The marshes of the Rann of Kutch in the southeast and the sandy wastes of the Thar Desert extending northward and northeastward, interspersed with the outcrops and the hilly terrain of the Aravallis, make up the southeastern border. It is here that the Himalayas and the Aravallis come sharply closer forming a nearly 20(kilometer-wide gateway connecting the two most fertile and eventful valleys of India. The Ganges Valley too, in its turn, is bounded by the Himalayas in the north, by the Vindhyas in the south, and, anciently, by densely wooded marshes of the east. The Bay of Bengal lies to its south and a north-south oriented chain of the steep mountains is further east. This exceedingly strategic location made Haryana a very lively transit zone, an area of compulsive and strong interactions, with a constant flow of two-way traffic in men, materials and ideas since the unknown past. It is all the more important in the context of the Indus Valley which has had a very special relevance in regard to the development of early human cultures in the Subcontinent. Geographically speaking, Haryana is an eastern extension of the Indus Plains, forming in fact the apex of the region.

The natural barriers of the Indus Valley channeled the movement of people of developing cultures as well as the advance of marching hordes, toward the rich plains of Haryana before entering the Ganges Valley or the highlands of Central India. The route running along the Himalayas instantly brought them here from the northwest or from the hills beyond, as did the route running north along the River Sarasvati. The latter route was useful for those moving from the Arabian Sea coast, Sind, the centrally located Sind-Sagar *doab,* or from the connected passes of the Baluchi hills. Thus the "lost" Sarasvati traversed the Indus Plains diagonally and connected the southern sea with the Siwalik foothills on the Yamuna.

Materially, Haryana and its adjoining regions abound in natural wealth. The Aravallis are rich in copper, iron, minerals and other raw materials. The copper (Agrawal 1970; 1971: 145; Agrawal, Magabandhu and Shekhar 1976; Agrawala 1978; Hegde 1968) and other minerals are said to have been commercially exploited during protohistoric times. That apart, these hills together with the Himalayas and the intervening riverine plains must have offered a variegated wealth of flora and fauna most of which have since vanished due to prolonged human interference and overexploitation. The riparian plain is rich in fertile land and water. It is presently blessed with two perennial rivers—the Yamuna and Ghaggar—in addition to a few shorter hill streams and seasonal torrents. But, in antiquity there should have been other perennial rivers such as the Sarasvati, and its two tributaries, the Drishadvati and the Apaya, all of Rigvedic fame. Their now dry beds are still traceable in Haryana and northern Rajasthan (Bhargava 1964: 52-101). The Sarasvati in particular has received the most intimate affection, reverence and imagery from the Rigvedic seers and the later poets. The *Rigveda* explicitly refers to its flowing from the hills to the sea (*Rigveda* VII. 95.2) and having a string of settlements on its banks (*Rigveda* VII. 96.2). During the later Vedic period, it had started drying up as recorded in the *Mahabharata* (Vana Parvan LXXXII: CXXX, and Salys XXXV), *Panchavimsa Brahmana* (XXV. 101), *Latyayana Srauta Sutra* (X. 15.1), *Baudhayana Dharma Sutra* (I. 2.9), and *Manava Dharma Sastra* (II. 21). Topographical studies as well as archaeological investigations of late have since amply borne out this fact. In the course of his extensive exploration in North and Central Haryana, and in some parts of the northeast Punjab (India), the present author has observed that the Sarasvati and its tributaries had probably been extensively harnessed. Protohistoric man apparently dug canals for irrigating fields and storing water in large ponds. The existence of a network of abandoned canals and river beds, dotted with numerous Chalcolithic and Early Iron Age sites, in the Sarasvati Valley in Haryana bears testimony to this. It also indicates large-scale deforestation, claiming land for agricultural purposes. In addition, the *Mahabharata* bears evidence that when the center of political activity shifted to the Ganges Valley, the Kurus maintained cattle land in this area.

Such large-scale exploitation of natural resources must have seriously disturbed the prevalent ecobalance and set most of those streams that were not fed by the snow on the path of gradual desiccation. However, the upper course of the Sarasvati, right from Adi Badri in the Siwaliks, traditionally held as its sources, to Bahar, running past Kapalmochan, Bhagwanpura, Thanesar-Kurukshetra and Pehoa (ancient Prithudaka), is still seasonally alive. At Bahar it has lately been taken by the Ghaggar. Its old course, which now runs parallel to that of the Ghaggar, is still traceable and forms the Sottar Valley now famous for yielding bumper crops and potable subsoil water. This valley, which is two to four kilometers wide, and even more at places, runs through the districts of Jind, Hissar and Sirsa in Haryana until it meets the modern Ghaggar near the Rajasthan border. Before protective bunds and the present network of roads were built along with irrigation and stormwater canals along the entire length and breadth of the Sottar Valley, it used to occasionally carry a volume of water during the rainy season. It is still publicly known variously as the Rangoi, Nai, Nadi, or Hakra Ban. A series of mounds runs along both its banks. The mound of Banawali is one of those on the northern flank.

THE SITE

Banawali is located on the time-honored "Northern Highway." This connected the Ganges Valley, the Himalayan regions and Central India with the passes of the northwestern hills and the Arabian Sea located across the Indus Plains. It lost some of its importance in the recent past when Sher Shah Sur (1539-45) developed a more northerly route because of increased desertic conditions in this region, in addition to other factors.

The approximate straight line distances (in kilometers) and directions from Banawali to well-known Harappan towns are: Kalibangan, 120 west by south; Mohenjodaro, 740 west southwest; Harappa, 260 west northwest; Roopnagar (formerly Rupar), 180 northeast; Mitathal, 110 southeast; and Rakhigarhi (a very extensive and prospective site in district Jind, Haryana), 80 east northeast. The mound at Banawali stands about half a kilometer south southwest of the village of the same name. It spreads over an area of about 400 by 400 meters and rises to a height of 10 meters from the surrounding area. In its present form it is a single mound. The marginally truncated southern side and the extensively leveled western and northern flanks have now been appropriated for agriculture. The twin mounds, as observed by Suraj Bhan (1975: 95, fn. 2), are not vouched for by the local folk who saw it prior to the recent despoliation. The south-central part of the mound is conspicuously higher than other parts. The sides on the east, west and south are very steep. So are both the corner margins along the northern face, the central portion of which, however, descends gradually into a shallow depression only to rise again for a short length and then stretch out for about 100 meters. More or less similarly, the eastern and western slopes too, after the sharp descent, fan out over nearly 150 meters on either side. On the south the side drops down sharply to terminate on the level plain. The excavations reveal that the higher segment generally conceals the Indus citadel built over the rubble of the Pre-Indus settlement. In the southern half of the western flank the Indus remains have been almost completely removed and the underlying Pre-Indus remains stand exposed on the surface, whereas the northern half contains only Harappan relics. The Post-Indus habitation spreads out over the eastern flank beyond the ankle of the mound.

The cultural assemblage (Bisht in press: 1 ff; 1978: 86-88; 1976b; 1977) gathered during four field seasons at Banawali has been divided into three periods:

Period I : Pre-Indus or Kalibangan Culture
Period II : Indus Culture
Period III : Post-Indus or Banawali-Bara Culture

PERIOD I: PRE-INDUS/KALIBANGAN CULTURE

The Pre-Indus levels were sounded on the truncated western flank. These are three meters thick, although they might be deeper toward the center of the mound. The excavated material bears an overall likeness to that from Kalibangan I, the type-site, as described by Lal and Thapar (1967: 78-88; Lal 1969: 15-16; Thapar 1965: 135-38; 1969; 1975).

The settlement was founded on alluvium. Although the area under operation was too small to provide much information on town planning, some system seems to have been followed since the structures are oriented to cardinal directions. The house walls, in most cases, were built of single bricks. Thus the houses should have been single-storied, quite low and squat, probably with light thatched roofs, lacking mud terracing. The bricks, both fired (Pl. 10.1) and sun-dried (Pl. 10.2), were meticulously standardized, conforming to the ratio 1:2:3. This ratio was observed earlier at Kalibangan. But, the dimensions at Banawali are 12 by 24 by 36 centimeters and 13 by 26 by 39 centimeters as compared to 10 by 20 by 30 centimeters at Kalibangan. In addition, there is one aberrant size: 24 by 24 centimeters, the thickness remaining still indeterminate. However, the succession of structural phases remains as yet to be built up. The most interesting structure so far exposed is a two-meter wide brick-on-edge pathway which, curiously enough, runs along the inner side of the defensive wall of the Indus citadel (Pl. 10.3) and, on the present showing, it limits the Pre-Indus settlement on the north. It should therefore not be surprising if the Indus wall is found to conceal within it the enclosure wall of the antecedent period, as is the case in places at Kalibangan. Another noteworthy structure is a partially uncovered house complex with several hearths, ovens and fire pits in the room (Pl. 10.4). Excessive fire activity in this area has reddened house floors there. Surely, it should be a workshop, plausibly that of a metalsmith. One more interesting feature is the presence of precisely circular pits, both large and small, neatly cut deep into the house floors. In one case, a pit rim was lined with mud bricks and its walls were thickly plastered. Most of these pits yield fine bluish ash, occasionally mixed with charred grains; although the pits themselves show no sign of firing. These might be the storage silos or bins. The paucity, or near absence, of large storage jars lends further credence to this surmise.

The ceramic inventory records all six Kalibangan fabrics, including the methods of surface dressing, shapes and many of the decorative motifs (Pl. 10.5). Additionally, there are pottery lugs and loop-handles. Certain ceramic vessels have an incised decoration of shallow multiple wavy or vertical lines, deep-cut sigmas or casually done criss-cross patterns executed on the exterior. Fabric "D" Incised Ware is also found (Pl. 10.6).

Copper is scarce. Points and awls of bone are numerous. The lithic industry is represented by a solitary microblade of chalcedony. Characteristic clay bangles with triangular, as well as square cross-sections, blackish gray color, are duly found in addition to round examples, red in color. Among other important antiquities are beads of gold, semiprecious stones, steatite (including disc beads), faience, shell, bone and clay; bangles of shell, faience and copper; animal figurines of terracotta; clay balls; stone pebbles and other miscellaneous objects. However, the most significant find is a sherd depicting a canopied cart with spoked wheels (Pl. 10.7). Many sherds are found with engraved or fingernail marks on the base and occasionally on the exterior. Similar marks have already been observed on other pottery, chronologically and genetically ascribable to Pre-Indus times, from Baluchistan and South Afghanistan. These are illustrated and briefly discussed by Fairservis (1971: 142, 144 Fig. 35) who tends to take them as either potter's marks or trade marks. Lal (1969) also notes them. Such marks are also prevalent on the Pre-Harappan ceramics of the Indus Valley. Some of them are quite complex and can be derived from naturistic or stylized animal forms. They are likely to have been auspicious signs. Banawali I has also yielded a stone weight, perhaps the first of its kind. Its weight is 87.855 grams. Although it does not fit the binary system of Indus weights, it closely approximates a sum a hundred times the supposed Indus unit weight of 0.857 grams (Marshall 1931: 590-91; Mackay 1943: 602, 606, Table III).

Preliminary studies made in small segments of two quadrants may point to the transformation of the Pre-Indus ceramics and the marginal appearance of Indus pottery. If this is the case, it should denote that a phase of vigorous cultural interaction was taking place during the transition. This phenomenon is represented by a thin deposit of only about 50 centimeters. The buff and light red fabrics of the Pre-Indus ceramics tend to be more matted and pinkish red or buff in color and heavier and thicker in texture in these areas. Predilection for painting as well as the use of white pigment seems to decline. Luxuriant motifs give way to simpler designs and there is generally a restraint in decoration. In addition, mundanely utilitarian Indus shapes make their appearance, although the Classic Harappan forms and decoration are not present. In one quadrant, bricks of both Pre-Indus and Indus sizes are found to have been used side by side in construction.

However, only further work at the site will help to properly evaluate the real import of this seemingly transitional phase that has been observed at Banawali. The presence of such a transitional phase has already been established at Amri (Casal 1964) and Kot Diji (Khan 1965). It was also pointed out at Mitathal (Suraj Bhan 1975: 15, 18, 81) and Siswal (Suraj Bhan 1975: 103), where Harappan pottery makes its "intrusive" or "limited" appearance in the existing local cultures of Pre-Indus genre. This phenomenon is altogether absent at Kalibangan, despite the fact that the Pre-Indus ceramic tradition continued into the middle levels of the succeeding Indus Culture. For the present, it is probably best for this phase to remain a shadowy entity at Banawali, pending further confirmation through excavations.

PERIOD II: MATURE INDUS CULTURE

With proverbial dramatic precocity the full-bloomed Indus Culture makes its appearance at Banawali. This includes its essential cultural appurtenances: town-planning and architecture, ceramics, seals, script, weights, clay figurines, terracotta "cakes," items of ornament and miscellaneous knick-knacks and tools. The older ceramic tradition continues throughout Period II as a culture-companion but in reduced frequency. New pottery elements, indicating other sources, also enter the pottery corpus.

Excavations have indicated that the entire Indus town at Banawali was securely enclosed by massive defenses, the eastern arm of which has already been determined for a length of nearly one hundred meters along the base of the mound. Dimensions of this town have been ascertained through excavations. It extends over not less than 275 and 130 meters respectively along the north-south and east-west axes, while its extent towards the north and west may continue ever farther. Within the walled town there is a fortified acropolis, a regular road system and well-defined residential sectors. The acropolis stands out preeminently on higher ground built up by the accumulation of Pre-Indus debris. It overlooks "down town" stretching beyond the fortifications toward the north, east and to the riverside on the south. Surface contours suggest that the acropolis may share a common wall with the town along the riverside. However, one is not certain whether there is a similar arrangement on the west where the original contours of the mound have lately been substantially eroded. On present showing, the citadel appears to occupy the southwestern quarter (or the south-central segment), of the town and thus simulates the general layout of the Indus town of Lothal; albeit with the difference that the Lothal acropolis appropriates the southeastern quarter of the town. Only the high podium upon which it was built segregates it from the "lower town." Whereas at Banawali, the eastern and northern arms together with northeastern turn of the defenses of the citadel (Pls. 10.8 and 10.9) have been extensively laid bare. Their width ranges from 5.4 to seven meters. The two squarish bastions that were unearthed along the east wall project towards the "down town." By the side of the bastion at the northeastern corner, a 1.5 meter wide opening with a built-in *pucca* drain pierces the defensive wall. It is not unlikely that it served as both the postern entrance and as a stormwater drain. As to the entrance it may be mentioned that it has links to the two major roads, both 5.4 meters wide and running north-south on either side of the defense wall. In addition a 1.5 meter wide alley, coming from the residential blocks of the "upper town," passes through this opening by cutting across both the major roads at right angles. It runs further eastwards between the house blocks of the "lower town." Another entry point is found across the northern arm in the form of a 1.5 meter *pucca* ramp leading one up from the "down town" onto the citadel (Pl. 10.10).

The "lower town," which has been subjected to more soundings than the acropolis, indicates that roads played a significant role in the civic planning. Major roads run not only on both sides of the citadel wall, but also along the inner side of the town wall to the east. Even the roads distantly removed run parallel to the general plan. They scrupulously follow the orientation of the citadel defenses even though they have to negotiate awkward turns in order to maintain conformity. The flanking residential sectors also follow suit at the cost of convenience and simplified planning. This is manifest in the plan of the part of the lower town that is located in the tortuous northwestern corner of the wall of the acropolis. Normally, two longitudinal roads bound a row of single house blocks which, at least on one side, are separated by narrow latitudinal alleys. It may be mentioned that the "lower town," which is narrowest—70 meters in breadth—in the southeastern quarter, has as many as three major roads, each as wide as 5.5 meters, whereas there are only two rows of house blocks in between. The total area covered by roads is thus as much as one-fourth of the whole. Such planning would have imparted to the township an air of pleasant lightness.

Houses are normally large and spacious, containing several rooms meant variously for sleeping, sitting, storage, kitchen, toilet and worship. There is usually a courtyard, and at times a corridor, in a house. In at least one case, a sitting room was paved with mud bricks. It is this room which yielded the famous inscribed seal depicting the horned tiger. The toilet of this house was provided with a wash basin placed on a high place in a corner near the drain which carried off waste water into a sullage jar placed outside on the street. This was normal practice at Banawali. Surely, this house (Pls. 10.11 a and b) belonged to a rich merchant as it has yielded more than one seal, a few weights and a large number of jars half embedded in the house floors. Another large house (Pl. 10.12) may have belonged to a jewelry dealer as it produced numerous beads including etched carnelian examples, those of gold and lapis lazuli as well as their imitations. There were also many small weights. A house was generally provided with a room containing a square fireplace, with or without brick lining, but with a longish cone of clay placed in the center. This was also noticed at Kalibangan. Another noteworthy feature is the presence of small cubicles in the massive walls. These generally measure one by one meter and sometimes two by one meters, and no doors. These were most plausibly blind vaults or bins meant for valuables, or foodgrains. If this is so, there should have been one or two openings. One of these was probably at some distance below the ceiling. This was used to feed in material. The other was just above the floor level and was used to gain access to the food grains. Only this postulate explains the probable use of such small cubicles which are otherwise too small to be regular storerooms. One of the rooms had a platform constructed against a wall. It also had a curious fireplace with thin, vertical mud walls.

In most cases, the house walls near ground level were strenghtened with a lining of bricks placed vertically, or a footwork of rammed earth. This protected them against underscoring caused by natural agencies or vandalism of small animals or playful children. On the road side there were sometimes platforms or brick-lined fodder tubs. All structures, as a rule, were neatly plastered with mud, usually mixed with ash, straw or cow dung.

So far, Banawali II has five, or probably six, successive building phases (Pl. 10.13). As found elsewhere in the Indus context, the original layout of the town was maintained most zealously throughout the lifetime of the culture. However, a public drainage system is conspicuously absent at Banawali and individuals must have been called on to maintain a high standard of hygiene. They did this by depositing household refuse at fixed points and by draining sullage into soakage jars placed on the street. From there the garbage might have been removed by municipal scavengers. The composition of road materials indicates that there is very little household refuse there. Occasional undulations in the roads seem to have been filled in with earth laden with heavier matter such as potsherds and waste terracotta nodules, etc. Fallen debris from a collapsed house were probably promptly thrown out of the town. Nothing was obtained about door sills or leafs, nor about the roofing method. Some of the houses had walls as thick as one meter. These might have been double storied as such examples are not wanting in the rural Punjab even today.

Bricks, both baked and sun-dried, were carefully molded into various sizes which, except the wedge-shaped examples, form two broad groups and always give the ratio of 1:2:4 as regards thickness, width and length. The smaller bricks, which variously measure 6 by 12 by 24 centimeters; 6.5 by 13 by 26; 7 by 14 by 28; 7.5 by 15 by 30 or 8 by 16 by 32, were used in constructing residential houses. The larger ones, 10 by 20 by 40 centimeters; 11 by 22 by 44; 12 by 24 by 48 and 12.5 by 25 by 50, were used in massive structures such as defenses. Fired bricks are normally used in drains, wells and bathing platforms; places with a constant use of water.

Classic Indus ceramics come in all their manifestations (Pls. 10.14 and 10.15). Three other distinct wares of separate origins flourished alongside these. The most distinguished of these is the group of Kalibangan Wares which continue into the Harappan Period. In this process, Kalibangan Fabrics C and D gradually merge with Indus Wares to which they bear a remarkable resemblance in technological finesse and general appearance. On the other hand, Fabrics A, B and E influence each other and undergo a marked devolution already underway during the supposed Intermediate Phase which will be briefly discussed later. On the whole these ceramics survive throughout Period II. They retain much of their pristine characteristics including forms and surface decoration. However, these wares are not dominant in either number or types. Basically, they were used to make unassuming and commonplace forms such as vases, cooking vessels, small jars, basins and bowls in particular. During this period, as noted earlier, the ceramics tend to be more of a dull matt red, or pinkish red in color and are usually treated with either a dilute wash or no wash at all. The use of white paint seems to have been discarded early in Period II. This ceramic corpus compares well with that of Mitathal I and II A (Suraj Bhan 1975: 18-23, and 27-31) and Siswal "B" (Suraj Bhan 1975: 108), which Suraj Bhan calls "Late Siswal Ware."

A second non-classic Harappan pottery group is represented by a sprinkling of Red Ware sherds. These are distinct because of their unusually thick and heavy fabric and a subdued oily surface which was occasionally burnished. Technically, its family-likeness lies in the controversial Bara Ware which is consistently a principal associate of the Indus Culture in the upper regions of the Punjab and Haryana as is evident at Roopnagar (Ropar) I, Sanghol IA, Chandigarh and Mirzapur near Kurukshetra (Singh in press: 3). As circumstances indicate, Bara Ware might be a derivative of a separate Pre-Indus culture group. During Post-Indus times it attained phenomenal perfection in technique and variegation in painting. During this time it enjoyed a wide distribution in the Indo-Gangetic Divide and further eastwards.

The third ceramic class is an uninspiring dull red ware with a poor matt surface, thin walls and a coarse texture. The usual forms are vessels and cooking *handis* which often have an incised decoration or applique bands with cut-marks or pinchings on the shoulder. Sometimes these occur together and sometimes independently. When these occur together the bands enclose, underline, or overline the incised zone which usually contains deeply incised parallel horizontal lines subsequently cut through by vertical or oblique strokes, or wavy incisions. These patterns are later found to have been simulated by the Harappan potters on their own Indus Red Wares. However, the patterns which occur first on a duller ware seem to be comparable to those from Ahar (Sankalia, Deo and Ansari 1969). Decoration by way of incisions also occurs in Pre-Indus contexts, but that is not comparable to the case under discussion. This technique of embellishment later becomes the hallmark of the

Bara Ware of Post-Indus times.

Certain antiquities of Period II deserve special mention. Banawali has yielded about ten steatite seals and one terracotta sealing (Pl. 10.16). Exquisite examples of great artistic achievement, and a high degree of literacy, these seals are a definitive pointer to the commercial importance of Banawali. They also throw welcome light on their probable owners since they have only come from the lower town, not the citadel. To be more precise, these seals were generally recovered from houses which on the basis of their contents (noted elsewhere in the paper) have been tentatively attributed to a trader or a jeweler. It is also important to note that the site is very rich in lapis lazuli and gold. Gold plated terracotta beads were also found. Surprisingly, a vast number of lapis lazuli beads, and their imitations in paste, indicate that the trade in lapis was possibly both lucrative and brisk, contrary to the general belief that it was dwindling during Harappan times (Chakrabarti 1978: 54, 56). Etched carnelian beads are also plentiful. Of course, there are numerous examples of beads, inlays and studs in semiprecious stones, shall, bone, faience, steatite and clay. The enormity and variety of steatite beads is impressive. Faience was generally used to make bangles, *pipal* leaf-shaped earrings or small beads. Clay was also used to make bangles, anklets and an assortment of ornaments. Some of the terracotta human figurines from Banawali throw light on the style of personal decoration; but no new information is added in this regard (Pl. 10.17).

Equally revealing is the impressive range of small weights which broadly form four groups: (1) cubes and square prisms usually made of stone (Pl. 10.18); (2) gamesman-types of stone and bone (or ivory or antler) (Pl. 10.19); (3) clay pyramids; and (4) spheroid pebbles with plane bases and tops. Barring the last-mentioned examples, the other types come in a baffling range of size in the lower denominations. Of course, most of them fall within the known Indus weight system. Two specimens are of special interest. One is a perfect cube of stone that weighs 0.216 grams. This approximates one-fourth of Hemmy's Indus weight unit of 0.857 grams (Mackay 1943: 602, 606, Table III). It is exactly six times the weight of a rice grain at 0.036 grams (Marshall 1931: 596). The second specimen is a slightly chipped micro-gamesman type of green stone that weighs 0.68 grams. When intact, it should have weighed 0.072 grams, or twice a rice grain, which supports Hemmy's proposition that the Indus weight system was based on the rice grain (Marshall 1931: 596).

Banawali has also produced a unique tool made out of the coil of the spine of an animal. In addition to the natural central hole, it has two slit-holes, carefully cut through the bone along the diameter. These run into each other crosswise. With the aid of this survey instrument one can draw not only straight lines, but also certain angles. The author has seen a similar device in the Chalcolithic assemblage from Chirand (Saran, Bihar).

Terracotta figurines and other miscellaneous objects from Banawali II are, as a rule, all known Indus types. There are typical Indus figurines of Mother Goddesses represented by one complete specimen, one headless body, two ornate heads and certain pot-bellied specimens (Pl. 10.20). In addition, human figurines include carelessly made and highly stylized forms in a seated posture. Amongst the animals (Pls. 10.21 and 10.22) are terracotta of the bull, buffalo, ram, deer, rhinoceros, dog, tiger and birds. The bull figurines clearly outnumber all others. These are generally quite stylized and simplified forms; although a few are modeled quite realistically and sensitively. Certain bull figurines have slender and elongated bodies, muzzle mouths and conjoined long legs. These recall the painted figure of a deer executed on a pottery piece from the Pre-Indus levels of Kalibangan. M.R. Mughal has found animal figurines with conjoined legs in the assemblage anterior to the Kot Dijian, or his Early Harappan Culture (Mughal 1980). Such figurines are surely of Pre-Indus inspiration. Of course, some of these specimens are modeled realistically and artistically. Next in number are the bird forms. These come as bird whistles and pedestaled eagles or falcons with outstretched wings and tails. A few animal figurines were fitted with wheels (Pl. 10.23). Toy cart frames, including a few solid clay platforms, are abundant (Pl. 10.24). A few clay "cakes," nodules and sherds have engraved forms and symbols as well. One sherd has a beautifully engraved figure of a bull. In one case a human form is delineated in simplistic folk tradition. The body is shown as two opposed triangles, and hands and legs as lines.

Among the tools, there are objects of copper: arrowheads, spearheads, a fragmentary sickle blade, the typical razor, chisels, rings, double spiraled and simple pins, ear/nose rings and fish hooks (Pls. 10.25 and 10.26). There are points, a knife and scrapers of bone. Chert blades and fluted cores and flakes are also present. Other objects include clay net-sinkers, balls, pallets, sling balls, longish cones and solid wheels made of clay, besides numerous other household implements.

It should be restated that this period has five or six successive structural phases in a deposit of 4.5 meters. Three charcoal samples from one quadrant have given the following dates based on the 5730 year half-life. The reference year is 1950.

Laboratory Number	*Locus*	*Date*
1. PRL-204	(10) 1.13-1.28 MBS	1400 B.C. ± 130 years[1]
2. PRL-205	(12) 1.3 to 1.6 MBS	1960 B.C. ± 160 years
3. PRL-205	(14) 1.7 MBS	1980 B.C. ± 190 years[2]

These dates cover the penultimate phase of the citadel wall, and are comparable to the third building phase of the residential area. The first sample was collected just below the previous year's last excavated stratum. This was left exposed during the rainy season, hence there is strong chance of contamination. However, the following two dates are absolutely consistent and are ascribable to the upper middle levels of the Indus deposit. If one assigns the date of ca. 1800/1750 B.C. to the final phase, the beginning might be dated to about 2300 B.C. or so. As far as the other two dates [1240 B.C. + 110 (PRL ^{14}C Date List I/1976, 2) (Cyclostyled) and 1400 B.C. + 130 (PRL ^{14}C Date List III/1975, 2)] are concerned, the former comes from a disturbed trench and the latter subsequently turned out to belong to a pottery kiln of the following period.

It is not out of place to mention here that Kalibangan has nine successive Mature Harappan construction phases. Thus, the duration of the Indus Culture at Kalibangan should surely be longer than that at Banawali. But one has no data to find out which of the building phases of these two places should be coeval, nor does one know whether or not the beginning or the end of the settlements of these sites was simultaneous. It is also not known whether the town at Banawali started later and ended earlier. It is not unlikely, in the face of the facts, that the Pre-Indus deposit at Banawali is twice as thick as that at Kalibangan. At Banawali the Indus Culture is followed by a Post-Indus Culture, the authors of which may have overcome the Indus inhabitants, but this is not yet substantiated. Nor have the lower levels of Period III been adequately probed. Hence the precise relationship between the two cultures will remain unresolved until further work has been done.

It is certain however that Banawali was an important administrative headquarters or provincial capital and a prosperous trading center along the Sarasvati during the Indus times. Materially, the area must have been producing surplus food and the town is nicely located for trade in raw materials from the Aravallis as well as the Himalayas. The copper fields of North Rajasthan are also close at hand.

PERIOD III: POST-INDUS BANAWALI-BARA CULTURE

Period III is stratigraphically posterior to the Indus Culture. Post-Indus material is found in pits and kilns dug into Indus cultural debris on the top of the mound. There is also a settlement of Period III against the eastern wall of the Indus town. So much so that toward the end of this period the accumulation attained the extant height of the defensive wall. Then, regular structures are found raised and refuse pits and hearths dug into the defense wall itself (Pl. 10.27). Moreover, this period is explicitly devoid of all urban attributes and the classic, diagnostic objects which characterize the preceding period. Hence, one prefers to call it "Post-Indus," although it has widely been designated "Late Harappan" by a majority of authors. One would have liked to call it "Bara" alone, had that not been overshadowed by the controversy with regard to its chronological position and cultural status. The Banawali material of the Period III, in its present showing, is undoubtedly closely akin to that of the Bara Culture which Y.D. Sharma has made familiar to the archaeological world through his various illustrations and notes (Sharma 1955-56: 121-29; 1964: 7-10, 21-25, 71-72; 1973: 222-30; 1976: 10-12; also, Indian Archaeology: A review 1953-54: 6-7; 1954-55: 9-11). Tentatively, therefore, it is christened as the "Banawali-Bara Culture," of course, Post-Indus in time scale.

Bricks were not used as building material in Period III, and structures were made of packed earth; however they roughly follow the cardinal directions as noticed in Sanghol IB. The Pre-Indus tradition of digging large underground silos and small pits meticulously cut and perfectly circular with vertical, straight sides is again a common practice. In addition, corn bins made of clay as well as lime, and *tandoors* and ovens are normally found in every house (Bisht 1976a: 17; in press: 3, 4, 7, 8; Indian Archaeology: A review 1968-69: 25; 1969-70: 9; 1970-71: 30; Suraj Bhan 1975: 8-13, 17, 33-58, 111-15).

Interestingly, houses are usually found to have been kept so neat and tidy that no layers of ash or waste materials are generally met with through the successive floor levels. Another diagnostic, yet curious artifact, is a clay object that gradually tapers upwards from the square base and ultimately turns towards a side terminating into two short, horn-like prongs. It is usually found placed in the center of a hearth. This object has been found widely distributed at cognate sites. At times, the lower body of a vessel or a roughly straight-sided pottery stand is found to have been placed in a fire pit.

The ceramics are the most distinctly identifiable item of the cultural equipment of Period III (Pl. 10.28). In fact, as noted earlier, the assemblage occurs sporadically during the preceding period. The personality of these ceramics is markedly punctuated by an astounding resurgence of most of the painted motifs and pottery forms of the Pre-Indus tradition. There is an exuberance of painting and the gainful employment of the advanced Harappan technology. Unusually, rather unnecessarily, there is a thick, heavy, and yet very attractive ware that is oily to the touch and glossy in appearance. The classic Indus types and designs summarily disappear, and only utilitarian pots having roots in Pre-Indus times survive. The surface is generally dressed with a slip which ranges in color from subdued plum-red to purple, or from glowing buff to bright orange. Further, all forms undergo a phenomenal evolution. As a rule, the rim tends to be markedly thick, so as to become collared, beaded, squared, or ellipsoid. At times, it tends to be outturned, horizontally splayed-out, or to develop a molded profile. It occasionally has a deep undercut. Certain dishes-on-stand develop a drooping rim with an outward curve. Among other characteristics are the wide use of incised patterns and the roughening of the lower body in certain pots (Bisht 1976a: 17, 21; in press: 7–8). In addition, Cemetery H pottery, or its inspired forms, designs or features have also been noted at Banawali and elsewhere (Bisht 1976a: 21; Deshpande 1965: 10, 11, 128–77; Suraj Bhan 1973: 259–62; 1975: 33). There is also a burnished gray ware with a somewhat coarse texture generally used for the dish-on-stand. This vessel usually has a cylindrical stem, either hollow or solid. There is also gray or blackish, as well as a red ware of crude texture, tempered with sand or chaff or both.

Thus, multiple traditions went into the making of the Banawali-Bara Ware. But its parentage probably lies in a distinct ware which is a necessary appendage to the Indus assemblage at Roopnagar and the principal ceramics of the Indus-associated Sanghol IA (Bisht 1976a: 17–21) and Alamgirpur I. It is plausibly a local version or variety of the as yet little known Pre-Indus pottery, perhaps a near cognate of the Pre-Defense Harappa Ware which shares many traits with the various contemporary Chalcolithic Cultures.

Of the antiquities, the qualitative and quantitative profusion of faience ornaments is most impressive: bangles, anklets, rings, beads and *pipal*-leaf-shaped earrings. These and beads of semiprecious stones are fine examples of skillful artistry. The faience usually has a shiny silvery coat. One wonders whether or not the production centers which might have been manufacturing for foreign markets during the Indus times diverted their goods to the home markets following the collapse of the Indus economy. The Indus script, seals, clay bangles, steatite disc beads, chert weights, and for that matter, stone blades or any other aspect of an allied lithic industry are conspicuous by their absence. Copper is not plentiful, even rare. The classic triangular "cakes" disappear, but biconvex *idlis,* longish nodules and balls of clay are plentiful.

A sound sense of the inner chronology of the Banawali-Bara Culture at Banawali and its precise relationship with the antecedent period require further fieldwork. This was left incomplete during the last excavation since its identification was only made toward the close of the campaign there. However, it is certain that in the upper levels the pottery has perceptible signs of deterioration. It loses the natural verve and warmth of surface treatment and decoration. Most of the pottery tends to be dull or clumsily purplish or blackish red in color. The fabric is heavier and thick and in many cases it is soft-fired and tends to be ochreous in look and feel. In addition there is a handmade red ware which is thick, coarse, ill-fired and tempered with sand and chaff. This is generally employed in making large basins and jars. A gritty grayish ware is also occasionally encountered.

Period III at Banawali is also identifiable with

Sanghol I B Mitathal II B and partly with Daulatpur I (Singh in press: 6–7) Bhagwanpura IA (Joshi in press: 4–6, 23; 1978: 98, 101) and Dadheri IA (Joshi in press: 12–13, 23; 1978: 99–101). The two last mentioned phases probably represent the later life of the culture when degeneration had already set in. However, the Bara Culture with which it has a strong generic relationship, has been purposefully included with Banawali III. One wants to avoid confusion, resulting from the controversy that happens of late to surround the individuality of the Bara Culture. One feels, however, that the upper half of the deposit at Bara should belong to the period presently under discussion. More or less similarly, Chandigarh which has yielded classic Indus pottery and script, as well as other traits, also contains the Banawali-Bara Ware; but its stratigraphic status is indeterminate as the deposit is reportedly a disturbed one. However, the ceramics of Period III bear strong affinity with Cemetery H pottery. Likewise, the total equippage has much to share with that of Ambkheri in the Ganges Valley in the east, the Jhukar Culture in Sind (Mackay 1943: 103–31) and Lothal B, Rangpur II C and III (Rao 1963: 22–25, 59–61, 86–120; 1973: 181–82) in Gujarat. Significantly, some of the illustrated sherds from Mohenjodaro, a few of which are certainly from the upper levels, also belong to this phase. This leaves little doubt there was a settlement there, possibly not large, which somehow escaped the notice of the excavators. Much of it may have been washed away due to the erosion over the centuries.

In conclusion, the pottery is the most diagnostic and assertive antiquity of this period. The most noticeable features of Period III are the shapes and the painted motifs which are totally different from the classic Indus ceramics. They are, curiously enough, close to Pre-Indus pots. In addition, the tendentious thickening of the ware and the rims, as well as the basal rims in preference to this, and the featureless or gently out-curved or hooked ones of the antecedent period. Broadly speaking, these characteristics, in addition to many ceramic types and painted motifs and the more or less similar socioeconomic stage of development are also generally observed in contemporary cultures widely distributed in the upper and central Ganges Valley, Central India, parts of Rajasthan, Gujarat, Saurashtra and the Deccan. Sometimes, influences trickling into the remote areas in the south and the east have also been pointed out by various scholars in different contexts. Generally, the Chalcolithic, or cognate and allied cultures, which were flourishing in the areas mentioned above are believed or have been shown to fall in the broad chronological framework of Post-Indus times.

No radiocarbon dates are available for Period III. Stratigraphically, it is Post-Indus, as indicated earlier by the findings at Sanghol (Bisht 1976a: 20, 21; in press: 7, 8) and Mitathal (Suraj Bhan 1969: 7; 1975: 17), and subsequently confirmed at Banawali. The upper limit of the period has been finally detected with its dovetailing with PGW at Bhagwanpura and Dadheri (Joshi in press: 12-13; 1978: 101). Taking into account that the total thickness of cultural debris at Banawali is two to 2.5 meters it should be well within justifiable limits to assign it a tentative time-bracket of ca. 1700-1400 B.C.

On the whole, this period witnesses an overall disintegration of cities and towns and the emergence of smaller, more nebulous settlements concentrated in fertile areas. So far neither fortified sites nor towns worth the name have come to light. The glamour of social life and flourishing trade were life ways of the past. There appears to have been a phenomenal lack of standards and a rarity of art forms and materials. It was only toward the later half of the period that it developed a new style and in plastic art as seen at Bhagwanpura. Thus, it betrays a bias in favor of a rural economy in which there is little room for large-scale and diversified industrial production. This registered a sudden fall. Further, it amply demonstrates that there should be some serious inherent weakness in the socioeconomic mechanism of the preceding period. That is why, when it broke down, the whole structure crumbled under its sheer weight and society once again relapsed in its pastoral and agricultural lifestyle.

NOTES

[1] Published in PRL ^{14}C Date List III/1975, 2 (cyclostyled).

[2] Published in PRL ^{14}C Date List I/1976, 2 (cyclostyled).

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R.C. AGRAWALA and VIJAY KUMAR

11. Ganeshwar-Jodhpura Culture: New Traits in Indian Archaeology

IN 1972-73 the authors conducted archaeological excavations at Jodhpura (lat. 27°31′ north; long. 76°5′ east) in Tehsil Kotputli, District Jaipur, Rajasthan (IAR 1972-73, 1973-74; Kumar 1977; Agrawala and Kumar 1976). The site is located 98 kilometers from Jaipur town. Jodhpura mound is situated on the right bank of the Sabi River. The operations confirmed the stratigraphic position of unpainted Black and Red Ware which precedes Painted Gray Ware (PGW). This is also the case at Noh (District Bharatpur, Rajasthan) and Atranjikhera (District Etah, U.P.). The Jodhpura excavations produced a thick deposit of OCP. This is a painted red slipped ware with profuse incised designs on the exterior. It is stratigraphically prior to the Black and Red Ware, thus fixing the former in a well-defined horizon. Carbon samples run by the Physical Research Laboratory at Ahmedabad produced a date between 2500 and 2200 B.C. for the upper OCP levels at Jodhpura and Dr. D.P. Agrawal (Agrawal *et al.*, 1978; Agrawal and Kusumgar 1979) rightly christened it the *Jodhpura Culture* of the Pre-Harappan Period. The beginning of the OCP at Jodhpura may therefore be pushed back to about 2700-2800 B.C. It is worth noting that Jodhpura is situated barely 15 kilometers from Bairat (District Jaipur)—the old capital of Matsya Desa.

On 30 November 1977 a team of state archaeologists led by Shri R.C. Agrawala (Director, Archaeology and Museums, Jaipur, Rajasthan) examined copper material in the Sub-Treasury at Neem-ka-Thana in Sikar District of Rajasthan. The Treasury contained 60 flat copper celts from a "hoard" in the region. They measured 20 to 25 centimeters in length and can be associated with the Indus Valley complex. This was an outstanding discovery, the first of its kind not only in Rajasthan but in all of India. On further enquiries the authors and others rushed to the site near Ganeshwar (about 15 kilometers from Neem-ka-Thana) where these copper axes had been made more than four thousand years ago. OCP sherds littered the small mounds outside Ganeshwar village (lat. 37°40′ north; long. 75°51.30′ east). The site is about 250 kilometers from the Indus Valley site of Kalibangan and 160 kilometers from Bhadra, both in Ganganagar District of Rajasthan (Fig. 11.1). The distance between Jaipur and Ganeshwar is hardly 150 kilometers.

Further exploration in the vicinity of Ganeshwar required excavation of the mounds to the north of the Sanskrit School outside the village. By the beginning of 1979 these explorations and excavations became very rewarding because by then about 1000 copper objects in association with OCP had been found. These included copper arrow heads, rings, bangles, spear heads, chisels, balls, celts and the like. They are all made of copper derived from local mines. This is the first time in the history of Indian archaeology that such a rich find of prehistoric copper objects has been found at a single small site. But equally to the point is that the site is near the mines and in association with OCP from beginning to end. The thin blades, arrow heads and fish hooks are also characteristic of Indus sites and have not been found in the copper hoard sites of western Uttar Pradesh. The presence of a round terracotta cake at Ganeshwar is also important in this regard. The principal varieties of Ganeshwar

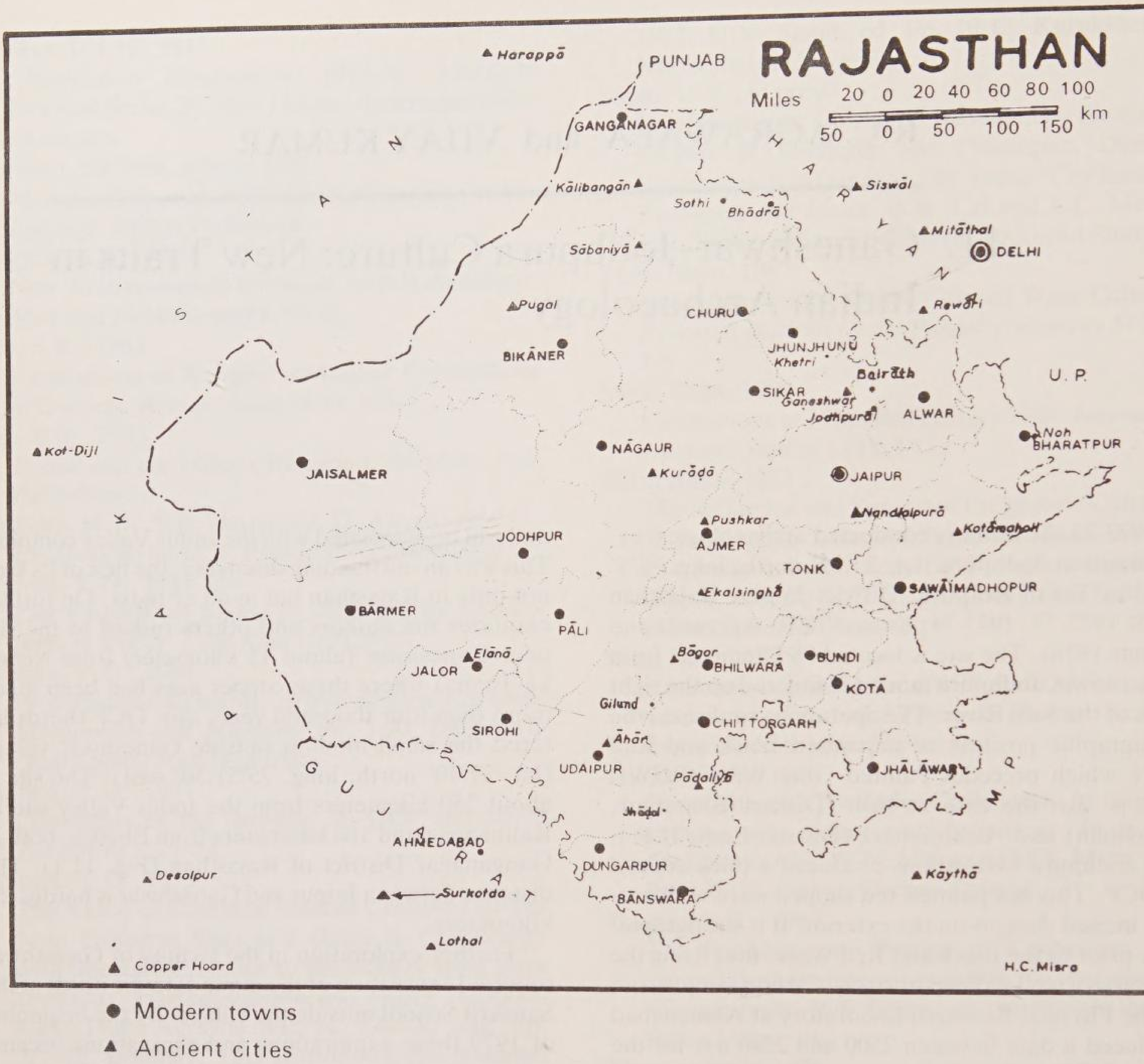
RAJASTHAN
Miles 20 0 20 40 60 80 100
km 50 0 50 100 150
Harappā
PUNJAB
GANGĀNAGAR
Kālibangān
Sothi
Bhādrā
Siswāl
Mitāthal
DELHI
Sābaniyā
Pugal
CHURU
Rewāri
BIKĀNER
JHUNJHUNŪ
Khetri
Bairāth
SIKAR
Ganeshwar
Jodhpurā
ALWAR
U. P.
Noh
BHARATPUR
Kot-Diji
JAISALMER
NĀGAUR
Kurādā
JAIPUR
Nandlalpurā
Pushkar
AJMER
Kotāmahall
JODHPUR
TONK
SAWĀIMADHOPUR
Ekalsinghā
BĀRMER
PĀLI
Elānā
JALOR
Bāgor
BHILWĀRĀ
BUNDI
KOTĀ
SIROHI
Gilund
CHITTORGARH
Āhār
UDAIPUR
Pādoliyā
JHĀLĀWAR
Jhādol
AHMEDABAD
DUNGARPUR
Kāythā
Desolpur
Surkotda
BĀNSWĀRĀ
Lothal
PAKISTAN
Copper Hoard
H.C. Misra
● Modern towns
▲ Ancient cities

Fig. 11.1. Protohistoric copper sites in Rajasthan. Second and third millennia B.C.

copper objects are described as follows:

Arrow Heads (Pls. 11.1 and 11.2). Cut from thin copper sheets, like those of Indus sites, the Ganeshwar arrow heads are rich and varied in size and shape. Most of them are of the barbed variety. A solitary exception is a tanged specimen from the surface. These arrow heads were fixed to a wooden shaft and secured with a whitish adhesive. This can still be seen on both the sides of arrow heads along with prominent wood impressions. Arrow heads like these have been collected from distant mounds, proving that they were actually once used for hunting purposes. Most of the examples have sharp points so that they could kill birds with a single stroke. But, quite a number have a curved tip which is very unusual. They were probably meant for hunting a flock of birds. One copper arrow head of this kind was excavated from Harappan levels at Banawali,[1] Haryana (Fig. 11.2). None of the copper arrow heads from Ganeshwar has a perforation for hafting. But contemporary arrow heads from Bagor (Fig. 11.3) (District Bhilwara, Rajasthan) were provided with two holes each (Misra 1970). This allowed them to be fixed to the wooden shaft with the help of a thin wire. The Ganeshwar variety of copper arrow head (without holes) was found in negligible numbers at

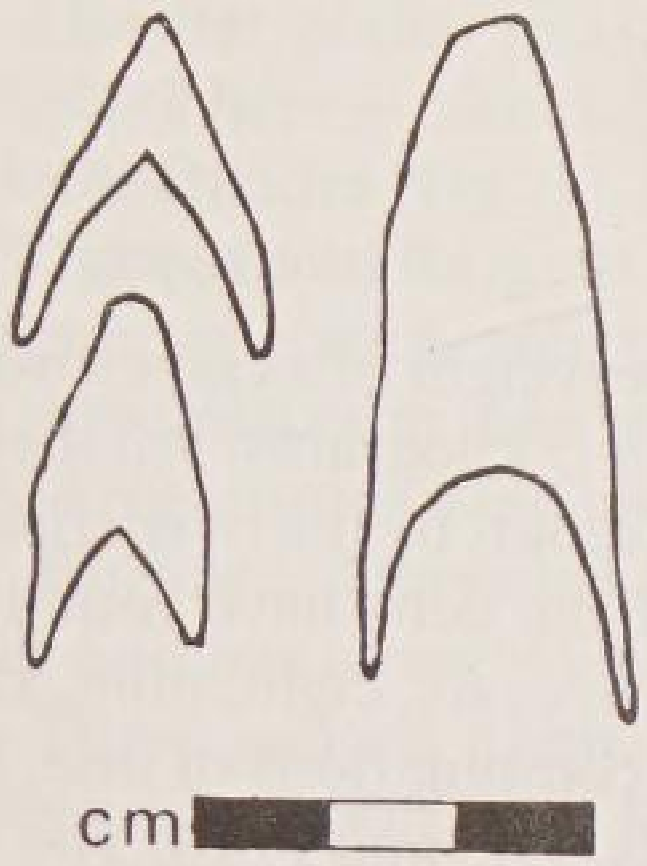

Fig. 11.2. Arrow heads from Banawali (Rajasthan). The larger example resembles those from Ganeshwar.

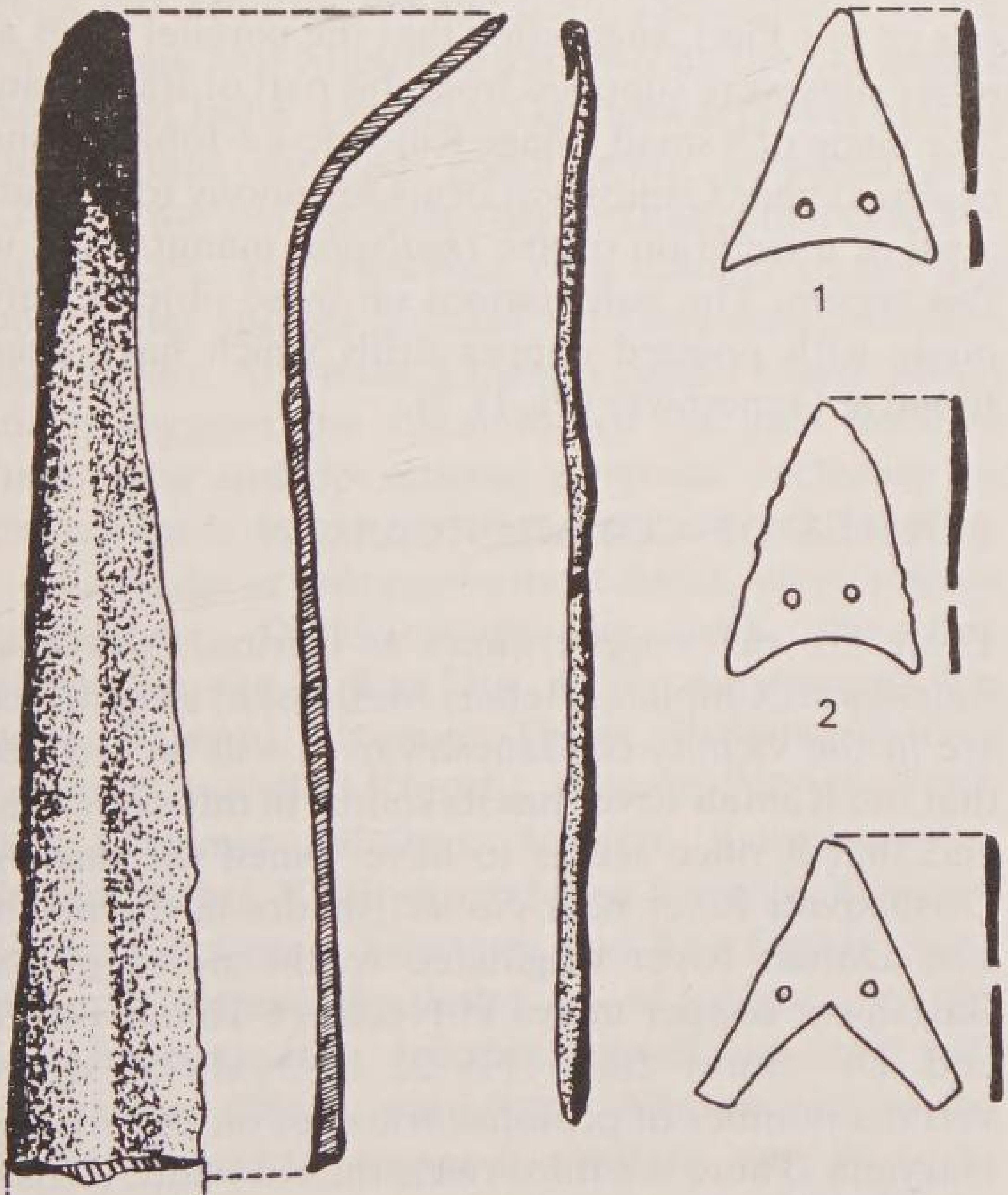

Fig. 11.3. Copper objects from Bagor (Rajasthan). Period II (2800–2000 B.C.).

Kalibangan, Lothal, Harappa, Mohenjodaro and Chanhudaro (Marshall 1931: Pl. CXLII, no. 13; Mackay 1938: Pls. CXXI, CXXVII, CXXXIII; Vats 1940: 383-84, Pl. CXXV, nos. 13-14). There are approximately 400 arrow heads of this style from Ganeshwar alone. This suggests that it was a local product and not one inspired by examples from the west. In fact, major sites like Mohenjodaro and Harappa have produced not more than twenty arrow heads each. But then, hunting may not have been an important activity in these urban settings—a fact which highlights the importance of the Ganeshwar finds.

The discovery of microliths with copper arrow heads at Ganeshwar suggests that the people of Ganeshwar, though they had developed a metallurgical technology, were still in a hunting stage. With rich copper mines nearby, they were able to exploit and successfully work this local resource as early as the third millennium B.C. But, even with this technology the OCP-using people at Ganeshwar were still hunting with the help of their many varieties of arrow heads (Pls. 11.1 and 11.2). The shapes of Indus arrow heads bear a close affinity to those from Ganeshwar. Artistically, some of the shapes of Ganeshwar arrow heads are unique (Pl. 11.2). They range in size from five to 6.5 centimeters in length. Comparable types have yet to be reported from areas west of the Indus Valley.

Copper arrow heads from Ganeshwar were analyzed by Dr. K.K. Tripathi of the Geological Survey of India, Jaipur. His results are as follows: copper 96.5 percent, silver 0.3 percent, arsenic 1 percent, lead 0.03 percent, tin 0.2 percent, nickel 0.04 percent, zinc 0.25 percent, iron 0.2 percent.

Spear Heads (Pl. 11.3). The Ganeshwar copper spear heads are generally very thin. There are, however, a few thick examples. Comparable objects were also found at Harappa and Mohenjodaro. They were attached to wooden shafts before actual use.

Fish Hooks (Pl. 11.4). The Ganeshwar copper fish hooks, numbering about 50, are usually not provided with a tang. A few years ago one example of a similar fish hook was recovered from the microlithic site Budha Pushkar in Ajmer District of Rajasthan by Mrs. Bridget Allchin (Allchin, Goudie and Hegde 1978: 143, Fig. 10.2). These fish hooks were also found at Harappa and Mohenjodaro in the early levels (Mackay 1938: Pls. CXXXII, no. 21 and CXXIV, no. 29; Vats 1940: CXXV, no. 28). Similar fish hooks were recovered from Banawali as well.

Shri J.P. Joshi, Director of Explorations and Excavations, Archaeological Survey of India in New Delhi has very kindly informed us of the discovery of copper arrow heads in the Pre-Harappan levels, and fish hooks in the Harappan levels, at Kalibangan. As noted, this site is about 250 kilometers from Ganeshwar (Fig. 11.1) and linked to it via the Kantali River which has its source near Ganeshwar. This river once joined the Drishadvati somewhere near Nohar-Sothi-Bhadra in Ganganagar District of Rajasthan. Thus, the copper objects from Kalibangan, 1200 in number, seem to have been manufactured and supplied by the people of the Ganeshwar-Khetri region. The Khetri copper mines are hardly 60 kilometers from Ganeshwar.

This proves beyond doubt that copper technology was well developed during the Pre-Harappan Period in the Ganeshwar-Khetri area as early as 2700 B.C. This is a date not far removed in time from Bagor (2800-2000 B.C.), a site that has yielded several copper objects, including the three arrow heads noted above. Viewed in this light, it is clear that the OCP-using people at Ganeshwar had evolved a full fledged copper technology by the third millennium B.C.

The copper objects from Ganeshwar were neither the products of Harappan refugees nor those of wandering itinerants. Exploitation of the nearby copper mines (smelting, casting, etc.) could not have been done by outsiders. It was the arduous job of those who lived in the region to explore the local mines. They also perfected their copper technology. The Indus people undoubtedly received copper and finished objects from the Ganeshwar region. Copper ingots were also sent to be made use of according to daily needs and requirements. Thus, most of the copper and copper artifacts for neighboring places in Pakistan, Punjab and Haryana was supplied from the Sikar-Jhunjhunu Districts of Rajasthan. Other sources of Harappan copper in the west cannot, of course, be denied.

Spiral-headed Pins. Ganeshwar also yielded a few fragmentary pins which were characteristic of Harappan Culture.

Celts (Pls. 11.5 and 11.6). The copper celts from Ganeshwar contain only a nominal quantity of tin as shown by the following details furnished by the Chemical Laboratory of the Geological Survey of India at Jaipur:

1) Copper	97%
2) Silver	0.2%
3) Arsenic	0.3%
4) Lead	1%
5) Tin	0.1%
6) Nickel	0.6%
7) Zinc	0.1%

The average weight of a Ganeshwar celt is approximately one to 1.5 kilograms. All these flat celts were prepared from molds by the *cireperdu* technique. The butt portion of the celts have round indentations in groups of four, five, six, eight, nine, 12 and as many as 15 in different combinations of one, two, three, four and six dots (Pls. 11.5 and 11.6). The varied permutations and combinations of dots recall somewhat similar marks on the Chalcolithic celts from Navdatoli (Wheeler 1959: Pl. 25) and Kayatha (Ansari and Dhavalikar 1975: 150). At Kayatha these celts were assigned a date of 2000–1800 B.C. by ^{14}C determinations. There was also incised pottery from these levels—a point of some significance which will be noted later. Copper celts with circular impressions also come from copper hoard sites in western Uttar Pradesh (Thaplyal and Shukla 1976). But there is no doubt that the Ganeshwar celts are the most numerous of this kind, suggesting that the parallel types at other sites were supplied from this part of Rajasthan. The name of a small village Kulhade-ka-Johad (Pond of Axes) near Ganeshwar bears testimony to the survival of a tradition of axe (*kulhada*) manufacture in this region. The indentations on these objects were made with pointed copper drills which have been found at Ganeshwar (Pl. 11.7).

ROUTES OF COMMUNICATION

There are rich copper mines at Dariba, Ahirwala, Baleshwar, Chiplata, Behar, Mothooka; all of which are in the vicinity of Ganeshwar. It will be recalled that the Kantali River has its source in this same area and that it once seems to have joined the ancient Drishadvati River near Nohar-Bhadra in the north. The Dohan River originated to the north of the Baleshwar copper mines in Neem-ka-Thana Tehsil, and Dr. Suraj Bhan (1972, 1973, 1975) discovered a number of protohistoric sites on this river in Haryana. There is a third river, the Kasaunti, (Krishnavati) also originating from the nearby Baleshwar-Dariba copper hills. Besides this, the Sota River, a tributary of the Sabi, takes its origin southeast of the Ahirwala-Dariba copper mines. It was via these rivers and streams that the ancient copper tools prepared in the Sikar region of Rajasthan seem to have been taken to different places in Haryana, Punjab and Uttar Pradesh. There is also a land route from Ganeshwar to Sothi-Bhadra (Fig. 11.1) via Neem-ka-Thana, Khetri, Chirawa and Rajgarh. Similarly, both Hissar and Bhiwani were connected with Rajgarh by road. Travel to these places in days gone by could be via both the land-river routes cited above. The site of Mitathal (near Bhiwani, Haryana) is not very far from Ganeshwar and has already yielded interesting copper objects. These include a celt, a chopper type *parasu,* rings, even a harpoon. Two long, heavy copper bar-celts, reported by Rewari and preserved in the Gurukul Museum at Jhajjar, bear close resemblance in size and shape, to the six specimens acquired in 1973 from Nandlalpura (near Chaksu, Jaipur District) by the Rajasthan State Department of Archaeology and Museums, Jaipur.

The availability of copper in the Sikar-Jhunjhunu area was responsible for the presence of ancient sites. These are very near the copper sources. We should not suggest that crude copper ores were carried to far off places. The discovery of a rich hoard of 60 copper celts (50 acquired by the State Department of Archaeology and Museums and two by the Geological Survey of India, Jaipur) at Ganeshwar proves beyond doubt that finished goods were prepared near Ganeshwar, wherefrom they were supplied to different places. The existence of a number of hot and cold water springs, around the Ganeshwar, Dariba, Baleshwar, Ahirwala, Chiplata copper mines, all the more suggests the suitability of the area for both habitation and operational purposes, including the extraction of copper ores, smelting and metal casting.

Ganeshwar falls on the most direct, shortest route connecting Delhi-Indraprastha with the Pre-Harappan site of Kot Diji. This route goes via Rewari, Narnaul, Neem-ka-Thana, Parbatsar-Kurada (incorrectly called Khurdi), Nagaur, Phalodi, Pokaran, Jaisalmer, Ghotaru, Mithrau, Sangrar, Alor, Sukhar Rohri, Khairpur and then Kot Diji. The road distance between Jaisalmer and Kot Diji is about 300 kilometers; the latter is, of course, not far from Mohenjodaro. Jaisalmer is well connected with Hyderabad (Sind), via Mirpur Khas as late as the British Period. Harappa is similarly easy to reach from Kalibangan through the Ghaggar (Hakra) and Sutlej Valleys. Kalibangan is approximately 250 kilometers from Ganeshwar. The Sikar-Jhunjhunu copper deposits of the Khetri belt were thus in easy reach for the Indus population, from both Harappa and Mohenjodaro. Sir John Marshall has rightly stated that: "Other stones in use both at Mohenjo-daro and Harappa were the fine grained yellow Jaisalmer stone, all three of them almost certainly came from Rajputana" (Marshall 1931: 31). That was possible only through trade. Impurity patterns in the Khetri copper ores when compared to those of Harappan copper-bronze artifacts, have led scholars like M.S. Vats and D.P. Agrawal (1971: 175) to the conclusion that "the Khetri-Rajputana mines are not only nearest of all to Harappa and Mohenjodaro, but also fulfill the test for key elements: i.e. nickle and arsenic" (Vats 1940: 379).[2] It is very likely, therefore, that these mines supplied the bulk of the metal, and even copper objects, to the Indus Valley sites.

The Ganeshwar copper finds (Agrawala 1978a, 1978b, 1979a, 1979b) also help in the proper assessment of so-called Khurdi hoard from Nagaur District of Rajasthan. The correct name for the find spot of 103 copper objects is "Kurada," which is located not very far from the Budha Pushkar site referred to above. This unique copper hoard from Rajasthan was originally made up of seven flat celts, 11 chisels, 21 curved blades of Ahar-Mitathal type, 55 rings, four plain copper bowls and five channel-spouted bowls. Of these only one celt, one chisel, one plain bowl, one channel-spouted bowl and two rings (10 objects in all) are preserved in the Government Museum at Jodhpur (Rajasthan). The curved blades, cut from thin copper sheets, were used as delicate choppers, similar to those excavated by R.C. Agrawala at Ahar (District Udaipur, Rajasthan) and by Suraj Bhan at Mitathal (District Bhiwani, Haryana). They can be dated to the second millennium B.C. What the Kalibangan excavators have described as an indeterminate curved blade, from the Pre-Harappan levels (Thapar 1975) seems to have originally been a copper chopper.[3] A close examination of the Kurada celt has brought to light the existence of four indentations, three in a single line and one below. This recalls Ganeshwar celts. The channel-spouted bowls from Kurada, prepared from thin copper sheets, recall a vessel in metal from Iran (Mughal 1972: 143, fn. 37; Hakemi 1972). This may suggest that these vessels were made for western demand.

OCP

The OCP (Pls. 11.8 through 11.11) from Ganeshwar and Jodhpura is identical in shapes and designs. The term OCP is now a misnomer; it is in fact red slipped painted pottery with profuse linear designs, executed with the help of a sharp, short, comb-like instrument. This was used to make horizontal oblique grooves, latticed designs and the like, on the exterior of vessels. This can also be seen on some of the Pre-Harappan fabrics at Kalibangan I, Sothi, Siswal, Bara and several sites in the Punjab, Haryana and western Uttar Pradesh. As many as eight thermoluminescence dates ranging between 2650 B.C. and 1180 B.C. (three prior to 2000 B.C., three between 2000-1500 B.C. and 1500 B.C. and two between 1500 B.C. and 1180 B.C.) are available for this ceramic. Thus, the copper hoards of Uttar Pradesh have a central date of 2000-1500 B.C. as rightly suggested by Thapar (1973), Gaur (1971-72, 1973) and others.[4]

It appears that this particular pottery had its origin in the Sikar-Jaipur regions of Rajasthan where two carbon dates for the upper OCP levels assign it to a period as early as 2500-2200 B.C., as already noted above. OCP traits moved from this part of Rajasthan to western Uttar Pradesh through the River Sabi, its tributaries, which were well connected with the Yamuna in days gone by. The incised and painted pottery in this part of Rajasthan, being early in date, is closely associated with Pre-Harappan and Harappan type copper objects. The typical copper harpoon, anthropomorphic figure and copper sword, so characteristic of the Copper Hoard Culture of western Uttar Pradesh, was a later development, consequent to the movement of the OCP people to the northeast from the Jodhpura-Ganeshwar region. It is therefore hardly possible to agree with the scholars who suggest that OCP is an extension of the central *Doab* complex through Sota and Sabi, the tributaries of Yamuna (Dikshit 1979). The crucial site of Ganeshwar, so abundant in OCP and copper artifacts, is situated just at the source of the Kantali River. It is thus absolutely wrong to think that OCP is absent in the Kantali Valley.

Our explorations in 1979 along this river even brought to light a Painted Gray Ware and Black and Red Ware site. This is on the right bank of Kantali itself, at Sonari-Jodhpur (District Jhunjhunu), about 25 kilometers from Ganeshwar. Further explorations are likely to throw more light on the problem. It appears that Painted Gray Ware penetrated as far as Sonari-Jodhpur through the upward course of the Dohan River, the source of which is not very far from the newly discovered site of Sonari-Jodhpur. The River Dohan itself is a part of the Sabi, Sota and Kasanti complex. The Dohan was joined by the Nai River from the north and one branch of the Drishadvati from the south. All these eventually fell into the Najafgarh Lake, which some scholars are tempted to identify with the Arvavat Sea of Vedic literature or the Dvaitavana Lake of the *Satapatha Brahmana* (Bhargava 1964: 13-14, 26-27, 47-51). These rivers played a great role in the diffusion and transformation of protohistoric cultures in Rajasthan, Haryana and western Uttar Pradesh, during the second and third millennia B.C.

It is also clear from the above that the authors of OCP did not belong to the same stock as the Pre-Harappan or Harappan people in the Indus Valley. Rather, they seem to have been a people indigenous to the Ganeshwar-Khetri region of Rajasthan. They were essentially experts in copper technology and supplied surplus copper objects to the east and west. This took place at a stage when there was substantial water in the Rivers Sabi, Sota, Kasaunti, Dohan and Kantali, all originating from the Sikar-Jhunjhunu Districts of Rajasthan.

Viewed in this light, the excavations and explorations at Ganeshwar have added a new horizon to Pre-Harappan copper technology. This can be dated to the period 2800-2000 B.C. There should now be no hesitation in calling it the "Ganeshwar-Jodhpura Culture." It is absolutely wrong to suggest that the Pre-Harappan Cultures were poor in metals. The richness of copper objects, both from Kalibangan and Ganeshwar, is quite evident. And, Ganeshwar was not likely to have been the only copper site of its type in the Khetri belt. There might have been many more such centers specializing in the manufacture of copper tools, pots and pans during the Pre-Harappan, Harappan and subsequent periods.

In addition to the unique copper-producing center of Ganeshwar there are many more protohistoric sites in Rajasthan. The state is thus a part of the Copper Map (Lal 1951: 21) of India (Fig. 11.1).

1) Pind Padliya, District Chittor

Six copper celts of Ganeshwar type were discovered in 1978 and acquired for the State Directorate of Archaeology and Museums, Jaipur. This Ahar Culture site is situated not far from the copper deposits of Bhinder and Bhadesara (Agrawala 1979a). Long celts of this kind are unusual in the Ahar complex.

2) Ahar, District Udaipur

The copper objects include flat celts of the short.

very light variety as discussed by H.D. Sankalia, S.B. Deo, and Z.D. Ansari (1969: 199-203). Earlier excavations by R.C. Agrawala at the site brought to light a thin knife blade in the lowest levels, dated to about 2100 B.C. There were also two copper choppers of the Mitathal type. The copper mines of Matoon and Umara, hardly 12 kilometers from the site, might have been tapped by the Aharians.

3) Bagor, District Bhilwara

Period II (2800-2000 B.C.) produced three barbed copper arrow heads with holes, a spear, an awl, etc., from a grave. The famous Pur-Dariba copper mines are at a stone's throw from Bagor.

4) Jhadol, District Udaipur (near Jai Samand Lake)

Vestiges of copper, in association with Ahar pottery, were discovered here with the assistance of Sri R.K. Biswas, G.S.I., Jaipur. The State Department of Archaeology further discovered contemporary sites at Bespura and Utpuria on the bank of a rivulet named the Tidi. This is a tributary of the River Gomti which falls into the River Som on the border of Dungarpur District in southern Rajasthan. There are two Ahar sites here (Karelia and Aspura) which were discovered by the Custodian, Ahar Museum in November 1979. This proves that the Ahar Culture had an extension to the Gomti and Soma belts to the south of Udaipur. This widens the horizon of Ahar Culture for the first time.

5) Kurada, District Nagaur

Incorrectly spelled "Kurdi" this unique copper hoard originally consisting of 103 objects enumerated above. Channel-spouted copper bowls from this place are quite unique in the realm of Indian archaeology.

6) Kalibangan, District Ganganagar

The Archaeological Survey of India recovered about 50 copper objects from the Pre-Harappan levels. More than 1200 copper specimens came from the Mature Harappan levels. This was kindly communicated by Sri J.P. Joshi on behalf of the Director General of Archaeological Survey of India. This also bears testimony to a flourishing copper industry in Rajasthan during the third millennium B.C. (see Pl. 11.12).

7) Sabania, District Bikaner

Two long copper celts from this site, with Indus script, are now preserved in the Gurukul Museum at Jhajjar (Haryana). Sabania is not very far from Kalibangan.

8) Pugal, District Bikaner

In 1979 Dr. Das Sharma of G.S.I. Jaipur discovered microliths and some fragments of copper arrow heads at Pugal. This was on the trade route to Bahawalpur (Pakistan) during historic times.

9) Nandlalpura, near Chaksu, District Jaipur

Six heavy bar celts, about 28 centimeters long, unlike those from the copper hoard of the Ganga-Yamuna *Doab,* were acquired at Nandlalpura in 1973. Two of the specimens from the Rewari-Narnaul area (on the border of Ganeshwar) are preserved in the Gurukul Museum at Jhajjar (Agrawala 1979a). These heavy bar celts, with both ends sharpened, seem to have been prepared for extracting ores, though no such tools have been discovered at Ganeshwar so far.

10) Elana, District Jalore

One copper flat celt was discovered in 1978 in a field outside the village of Elana (Agrawala 1979a), which is situated on the bank of the Jawai River. This is a tributary of River Luni, which, originating from the Pushkar-Ajmer area, falls into the Rann of Kutch. There are a number of Indus sites in Kutch.

11) Budha Pushkar, District Ajmer

An Indus type fish hook without a tang, and bearing a close resemblance to the Ganeshwar specimens was reported here by Mrs. Allchin a few years back.

12) Ekalasimgha, District Ajmer

In January 1979, a heavy bar celt was found in a field and acquired for the Directorate of Archaeology and Museums, Rajasthan, Jaipur. The site is only a few miles away from Barli River and the Khari (a tributary to the Banas) on the border of Bhilwara District. The unusual, heavy bar celt may belong to the Ahar complex.

13) Kota-Maholi, District Sawai Madhopur

The State Department of Archaeology and Museums recently acquired (September 1979) eight copper celts reported to be from Kota-Maholi Village, about 16 kilometers from Karauli town. They are a light variety and appear to have been used as agricultural implements like the modern *khurpis.* The site, when examined by the authors, yielded microliths as well. Kota-Maholi is not far from the Chambal River.

DISCUSSION

No copper harpoons, anthropomorphic figures or swords typical of the Copper Hoard Culture of the Ganga-Yamuna *Doab* have been reported from any part of Rajasthan. But the major copper deposits in the Ganeshwar-Khetri area suggest that even these second millennium objects may have been made in Rajasthan. The Aharians of course exploited the local ores of Udaipur-Bhilwara Districts, where a number of copper mines have been located. These are near Ahar Culture sites. It is, therefore, not plausible to suggest that Khetri copper ores were used to make Ahar artifacts. As late as 1951 Rajasthan was considered to be a blank with respect to protohistoric copper artifacts. But today we know that it played a great role in copper technology during the second and third millennia B.C.

ACKNOWLEDGMENTS

The authors are extremely thankful to Messrs. Harish Chandra Misra, Vijaya Kumar and M.S. Khangrot for assistance in the field, drawings and photography. The photographs have been kindly supplied by the Director, Archaeology and Museums, Rajasthan, Jaipur and are copyright of the Department. Grateful thanks are also due to Sri J.P. Joshi, Director, Archaeological Survey of India, New Delhi for furnishing the very important and valuable data on the copper objects from Kalibangan, Rajasthan. The Geological Survey of India Laboratory at Jaipur and P.R.L. Ahmedabad very kindly analyzed the Ganeshwar copper celt and Jodhpura charcoal for ^{14}C data respectively.

NOTES

Mr. R.C. Agrawala and Mr. Vijay Kumar were not participants in the Srinagar Conference. Their work on Ganeshwar-Jodhpura Culture is so important however, that this paper was solicited.

[1] The Banawali arrow heads from Harappan levels were examined by R.C. Agrawala in the office of the Director of Archaeology and Museums, Haryana, Chandigarh with the kind courtesy of the Director, Shri O.P. Bharadwaj, I.A.S., and Shri Saran, Deputy Director. The specimen with a curved top has not yet been published. Ganeshwar has, of course, yielded several copper arrow heads of this variety, suggesting links with the Indus complex.

[2] Dr. Agrawal has recently traced arsenic alloying in the copper hoards from Uttar Pradesh as well (Agrawal 1974).

[3] The important comparison between the Kalibangan chopper with the Khurdi (?), Mitathal, and Ahar specimens was first made by the senior author in his 1977 paper presented at the symposium titled "Indus Civilization: Problems and Issues" held in Simla at the Indian Institute of Advanced Study. The Khurdi example is illustrated in Ghosh (1961: 12, Pl. IIIB). Sankalia (1962: 82, Fig. 10) illustrates the channel-spouted copper bowl which is conspicuous by its absence from other Indian sites.

[4] For incised pottery at Sothi, Bara and other sites see Ghosh (1965). Y.D. Sharma covers the Bara Wares (1976). Editor's note: see also Y.D. Sharma's paper in this volume for illustrations of the wares in question.

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B.P. SINHA

12. Harappan Fallout (?) in the Mid-Gangetic Valley

Alamgirpur, Bara, Hulas, Ambkheri and the like are, as far as one knows, the easternmost extension of the Harappan Culture. G.R. Sharma's (1960) claim that the earliest level of Kausambi has rudiments of Harappan burnt brick fortification revements and other elements of architecture, has been strongly controverted, most convincingly by Ghosh (1973) and Lal (in this volume). But even Lal concedes that after the fall of the Harappan urban civilization, the communities dispersed in different directions and some of the common non-urban traits appear to have infiltrated into, and mixed with, the cultural traditions of various communities. Post-Harappan Cultures even in the Punjab, Haryana and western Uttar Pradesh, lack characteristic Harappan features like towns with elaborate planning, drainage and road systems, writing, varied designs in black on red pottery, burnt brick structures, bronze vessels and terracotta cakes.

It would be strange if the entire Harappan gamut, after blazing a luminous tail, completely disappeared as a meteor, leaving no trace behind. For example, it has been observed that many Harappan religious traits, though apparently not found in early Vedic traditions, can in many ways be seen as precursors of later Hinduism. While sophisticated, specialized urban features could not be adopted or adapted by succeeding village communities with lesser skills and poorer resources, some ceramic types and other features not distinctly urban could percolate into regions even far removed from distant Harappan settlements. This may have been via roaming potters selling their wares, and incidentally their ideas. This may be seen in later Chalcolithic Cultures at places like Rangpur, Navadatoli, Jorwe, Siswal and Mitathal with some close, and some distant, affinities with the Harappan ceramic tradition. This is evidenced most clearly in pottery forms and the technique of painting in black on red.

The central and eastern Gangetic Valley has so far been treated as free of even indirect Late Harappan influence or affinity (Dikshit 1979). In this short paper I want to draw the attention of scholars to the possibility of Harappan fallouts in the Mid-Gangetic Valley. Chirand, situated on the northern bank of the Ganges in Saran District of North Bihar, has yielded remains of a Neolithic Culture, provisionally dated to 2500-1500 B.C. (Sankalia 1974: 304). Following the Neolithic without a break is a rich Chalcolithic Culture with the characteristic Black and Red Ware and pottery painted white in the Ahar tradition. Copper is associated with these levels. Iron appears in a later phase of the culture; but NBP Ware is absent. Chalcolithic Chirand has a rich ceramic assemblage in which the dish-on-stand is a prominent type. The exact purpose of this form is not clear; although some have taken it to have been a fruit stand. One cannot be certain of any connection with religion or ritual. However, the Harappan perforated dish, not found at Chirand, could have had a ritual association, and the term "offering stand" may be a reasonable one. The bowl-on-stand or dish-on-stand may have been a table ware, or a drawingroom ware for more well-to-do people.

The dish-on-stand is a characteristic, if not diagnostic, Harappan form. As S. Piggott has observed:

"The presence of sherds of this type of vessel on a site marks the presence of the Harappan Civilization *as surely* as 'Samian' pottery betokens Roman occupation in Europe" (1950: 193; my emphasis). It is true that the dish-on-stand has been found in Pre- (or Early) Harappan Kalibangan I and in the same contexts at Amri and Kot Diji. But, it has also come from the deepest, earliest trenches at Mohenjodaro which could be earlier than Kalibangan I. After all, it has been suggested that the Harappans spread north and south from Mohenjodaro in Sind while in search of cultivable flood plain. They may even have gone to Harappa, Kalibangan and Lothal. Anyway, the fact that many Kalibangan I features are similar to those of the Mature Harappan leaves open the possibility of contact between Mohenjodaro and this settlement. The earliest ^{14}C date for Kalibangan I is TF-155, 2370±120 B.C. (Agrawal and Kusumgar 1974: 88) which is clearly later than the lowest levels of Mohenjodaro; even though there are not yet radiocarbon determinations available from these strata. The point to be made is that none of this controverts the view that this form is a distinctive type of Harappan pottery (Manchanda 1972: 6). The dish-on-stand has been found in Fabric C of Kalibangan I. This ware is thought to be close to the Mature Harappan fabric (Lal 1979: 72 and 73 Fig. 3, nos. 4-5) and so is late in Kalibangan I. This point is not even weakened by the presence of the dish-on-stand at Amri or Kot Diji. It is significant that it has not come from either Amri IA, the lower levels of Kot Diji, or Predefense Harappa for that matter. Its presence in Amri IB and later, Pre-Harappan Kot Diji may only mean that there was, once again, contact between these sites and Mohenjodaro which eventually overwhelmed them with the full impact of the Harappan Culture.

The occurrence of the dish-on-stand in the Post-Harappan Chalcolithic Culture of Rangpur, Ahar and Navadatoli does not conflict with the characterization of the type as Harappan. All these sites are very late in date and it could be that these vessels result from direct contact with the displaced, roving Harappan potters. Or they may be due to stimulus diffusion or culture contact.

The dish- and/or bowl-on-stand has been reported from Bara, Ambkheri, Hulas, and Baragaon in Saharanpur District and from Alamgirpur in Meerut District. Fragments of stands with broad bases have also been found at the OCP sites of Atranjikhera and Bahadarabad. R.C. Gaur (1969a: 97) reporting on the OCP complex at Atranjikhera says: "Although no complete dish on stand has been found the sherds do indicate their existence." No dish-on-stand has been reported from the Black and Red Ware complex at Atranjikhera (Gaur 1969b: 112). Some apparent dish-on-stand sherds have been reported from Kausambi IA (Misra 1969: 204).

Further east, at Chirand in the Mid-Ganges Valley, numerous examples of both the dish- and the bowl-on-stand have been found. These occur in the earliest Chalcolithic levels in three fabrics: (1) Black Ware (Fig. 12.1), (2) Black and Red Ware, and (3) Red Ware. The ^{14}C dates for Chalcolithic Period II at Chirand range between 1650±100 and 715±105 (Agrawal and Kusumgar 1974: 114). There are both the squat and the long-stemmed dish-on-stand. The presence of the squat dish-on-stand in Post-Harappan Chalcolithic Chirand tends to refute the view that the complete absence of the squat type in Kalibangan makes that site later than other Pre-Harappan sites (Manchanda 1972: 192). Many of the stems have corrugation-like moldings round their upper parts. But the most distinctive feature is cream-painted dots on the flaring base in some cases. On one of many variants of the Harappan dish-on-stand there are broad bands of red painted on the stem and other surfaces. This painting may be over a red or cream slip or directly on a plain surface. This feature is found only in Mohenjodaro, and appears to have gone out of use by the time the type infiltrated to other Harappan sites. In many cases horizontal bands or slanting lines to the right and left set between horizontal lines are painted in black on the stem. In one Chanhudaro example one finds set within the bracket of black bands a series of loops, ladders or leaf designs painted in black on the flaring base. At Alamgirpur there is a near parallel to a Chirand example with the dish painted with horizontal bands and dots in black. A similarly painted dish has been reported from Ambkheri. In the Chirand examples the dots are yellowish cream not black. This is the individuality of the Chirand type.

While there are several dishes-on-stand, there are only a few examples of the bowl-on-stand at Chirand. This form is frequently found at Harappa, Lothal A and Mohenjodaro. Krishna Deva (1969: 110) may not be far from right in holding that the Chirand dish-on-stand is a derivative type from the Mature Harappan Culture. The dish-on-stand has been found in graves at Mohenjodaro, Harappa, Lothal, Kalibangan and

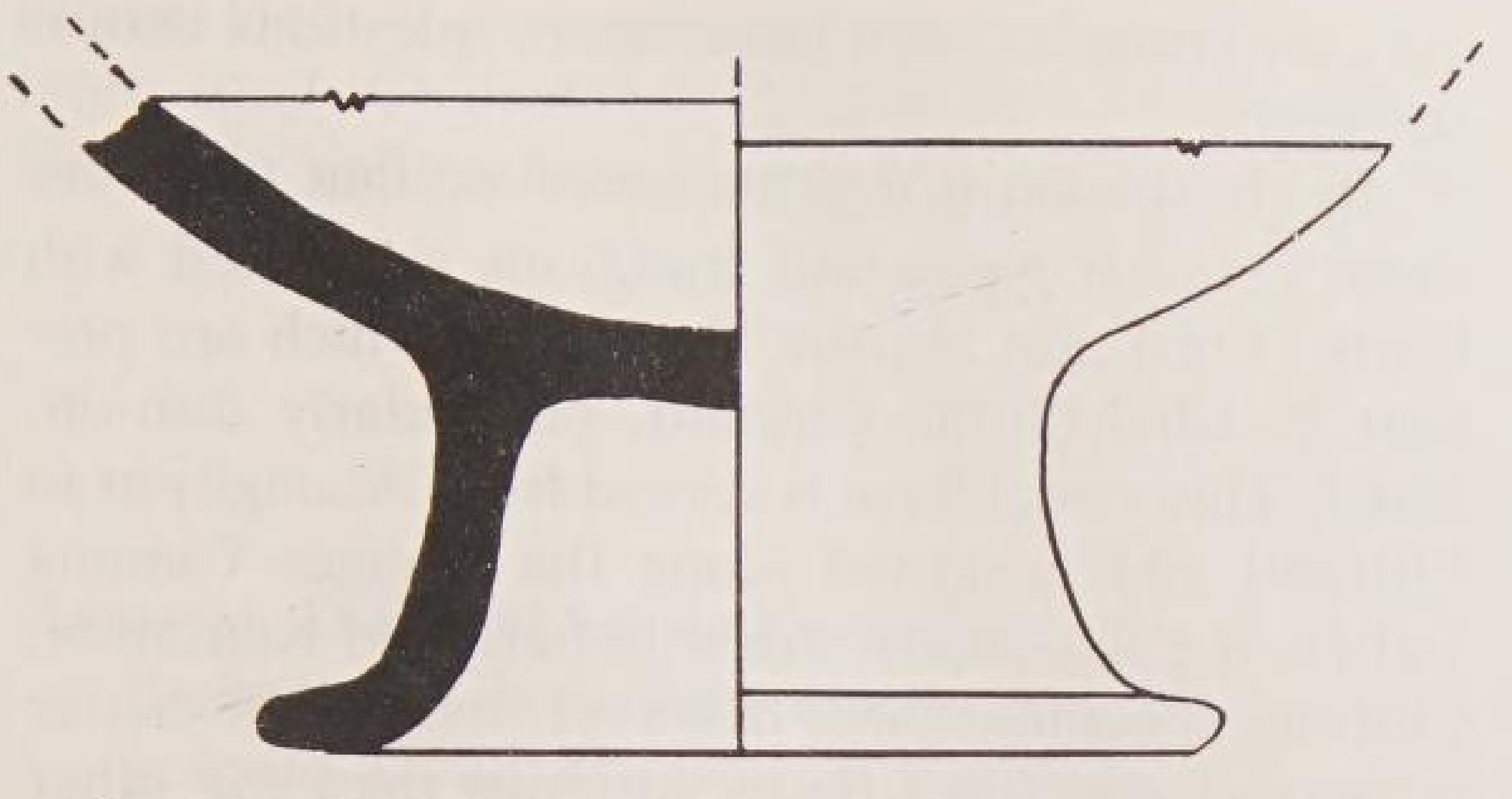

Fig. 12.1. Chirand Chalcolithic. Black Ware bowl-on-stand.

Amri. Similar examples are known from Cemetery A at Kish. But in Chirand there is no association of this vessel type with a burial, and it was probably a purely secular ware here. There is no evidence of soot on the inner surface of the dish. Thus it cannot be taken to have served as an offering firestand in any ritualistic way. Even in the Harappan context the tall-stemmed dish-on-stand is found in several examples in the homes of the well-to-do people of the cities. In Chirand the tall-stemmed type also predominates. It appears that this example was popular with the Chalcolithic village folk as a ware of distinction. Only horizontal excavations on a large scale will reveal settlement patterns and the existence of socio-economic strata pinpointing the greater popularity of this type with the better placed sections of the populations.

It may be noted that the dish-on-stand has been found in the course of explorations at Manjhi, west of Chirand, but in the same district. It has also been noticed in explorations at Maner, almost opposite Chirand on the southern bank of the Ganges, about 30 kilometers west of Patna. It is also present at Champa on the Ganges in Bhagalpur District of South Bihar. But it is significant to observe that in course of excavations further south at Sonepur in Gaya District no dish-on-stand was found though a very rich Chalcolithic Culture with Black on Red Ware as the predominant ceramic was excavated. However the remains of this vessel have been reported from Pandu Rajar Dhibi in West Bengal. The route of its spread appears to have been along the Ganges.

Another find from the Chirand Chalcolithic which is reminiscent of a Harappan prototype is the button-based goblet (Fig. 12.2, no. 14). This example is a Black Slipped Ware. It is very narrow with a slightly bulging belly, constricted at the top with narrow mouth. Exact parallels to this may be found at Mohenjodaro, Chanhudaro and Harappa where they have been called tall vases (although none of them is more than three inches high!). These concave/convex vessels have a beaded base. Manchanda (1972: 117, Figs. 270, 272) illustrates Mature Harappan examples which recall those from Chirand.

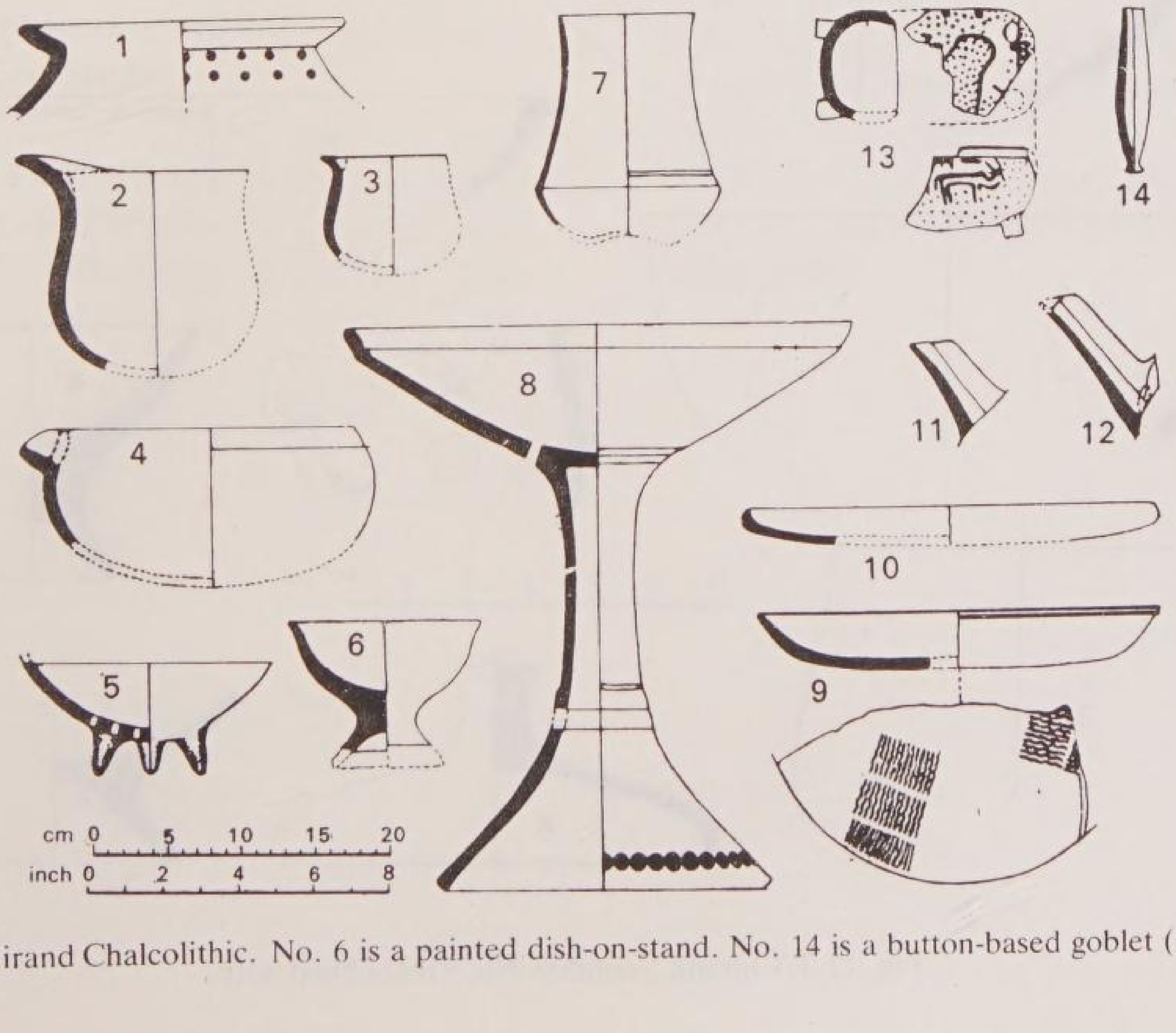

Fig. 12.2. Chirand Chalcolithic. No. 6 is a painted dish-on-stand. No. 14 is a button-based goblet (tall vase?).

Knobbed ware is another Harappan ceramic of which there are numerous examples from Chirand (Fig. 12.3). Here it occurs in a red and a black ware; however both fabrics are confined to the Neolithic levels of the site. This can be taken to indicate that the Neolithic of Chirand was contemporaneous with the Harappan. Unpainted Red Ware jar covers, or lids, with knobs which are once again reminiscent of Harappan types have also been found. The lids from the site are, however, not the dish type with the knob in the center.

There is an exceptionally rich and exquisitely manufactured bead assemblage from Neolithic Chirand. Beads made of steatite, agate, chalcedony, banded agate and jasper come in numerous shapes: barrel, cylindrical, spherical; some with minute holes. This assemblage is indicative of a high proficiency in bead manufacture not met with in other Neolithic sites in India. In fact it recalls the excellence of Harappan craftsmanship. But, whether or not the art of bead manufacture in Neolithic Chirand had direct, or even indirect, inspiration from the Harappan tradition is too complex an issue on which to even speculate at this time. Just the distribution of finds over an immense area raises more questions than it answers.

In conclusion it may be observed that there are some ceramic types and traditions associated with Early (Pre-) and Mature Harappans which are present in Chalcolithic Chirand, particularly dish-on-stand. This vessel form is spread from Alamgirpur to Chirand and is dotted along the Ganges-Yamuna Valley at Saharanpur, Atranjikhera and Kausambi. Chirand specimens are, however, numerous, better preserved and have more varieties than the other Post-Harappan sites in the Ganges. It must also be noted that the Chirand potters added their own individuality by painting in cream and selecting designs like a succession of solid large dots not met with anywhere else. It is obvious that while the design and the painting concept were taken from the Harappan tradition, new features were also introduced disproving a slavish imitation of a nonindigenous tradition.

Harappan urban civilization disappeared toward the middle of the 17th century B.C. There is, however, no doubt that many of the Harappan traditions not related to architecture and sophisticated urbanism infiltrated into regions beyond their geographical

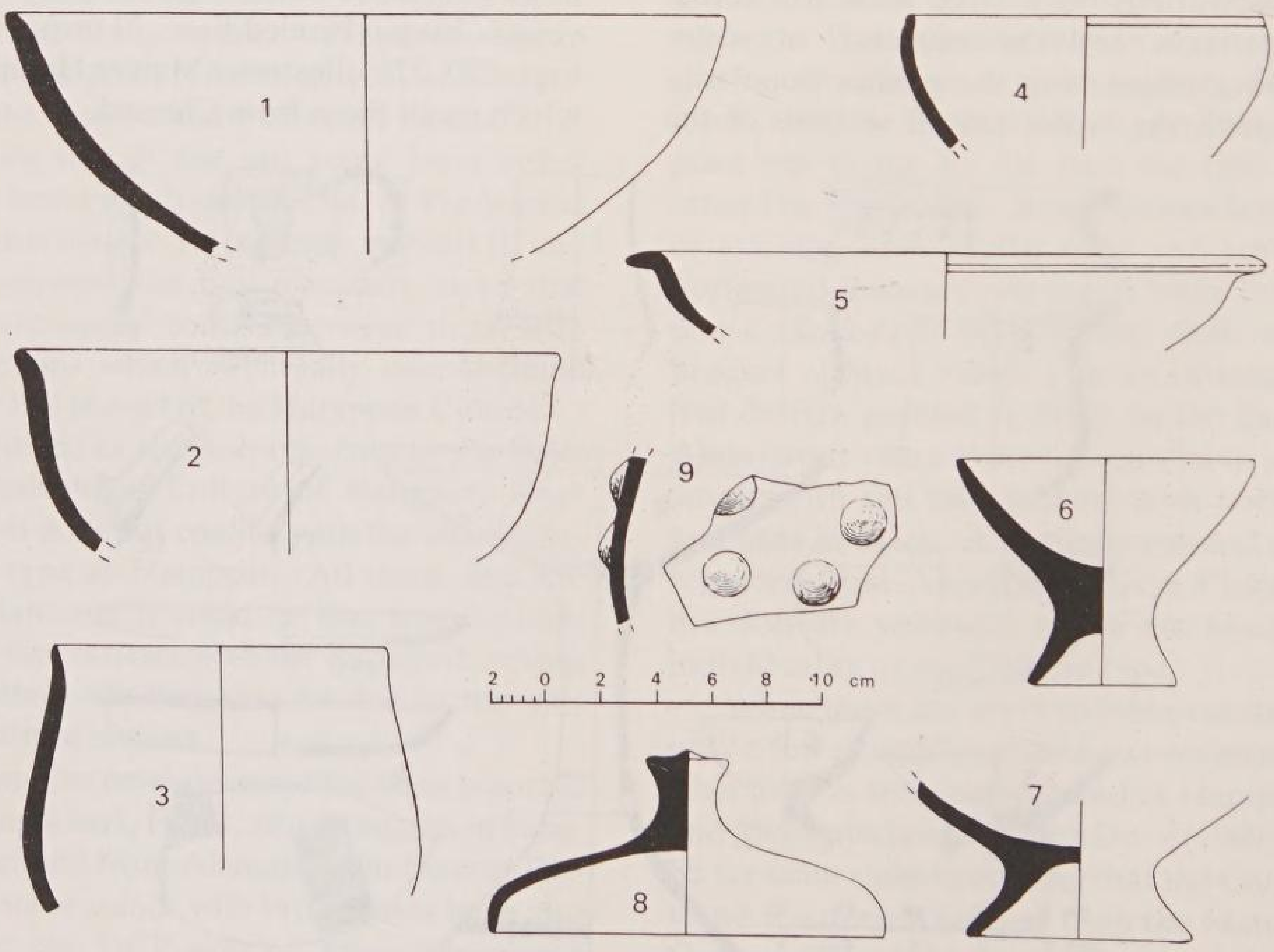

Fig. 12.3. Chirand Neolithic. No. 9 is knobbed ware.

limits. Here they were continuously adapted to by later rural Chalcolithic communities in the Mid-Gangetic Valley, for example. The dynamics of this mechanism are not clearly known; but the fact of its presence cannot be overlooked.

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Y.D. SHARMA

13. Harappan Complex on the Sutlej (India)

DATA FROM FIELDWORK

WITH the excavation of Harappa and Mohenjodaro, and the discovery of other related sites on the Indus and Ravi in the twenties of the current century, it was expected that the Harappan Civilization also spread along the other rivers of the Indus system. Manda on the right bank of the Chenab was discovered only recently (Joshi 1978, in press; Joshi and Madhu Bala, in this volume). Practically no Harappan or related site is known on the Beas proper, but several sites lie in a row along the Ravi-Beas *doab,* and along the East Bein which joins the Beas. The Sutlej-Ghaggar *doab* is replete with such sites, the more important of which are briefly described on the following pages (Fig. 13.1).

KOTLA NIHANG (lat. 30°57′ north; long. 76°32′ east)

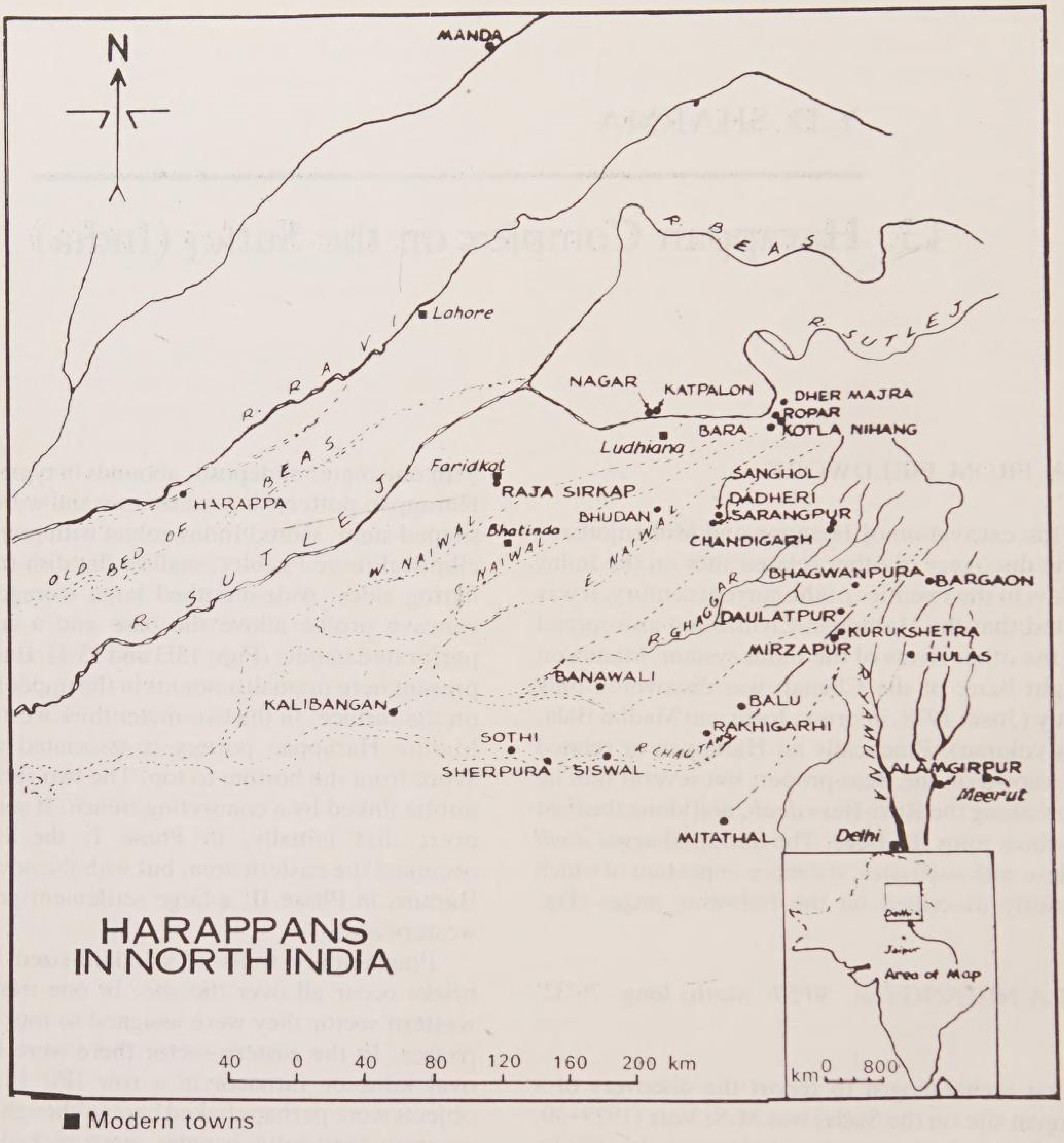
The first archaeologist to report the discovery of a Harappan site on the Sutlej was M.S. Vats (1929–30, 1940), the original excavator of Harappa. In 1929 he put in a few trenches at Kotla Nihang Khan, two kilometers southeast of the district town of Ropar (earlier spelt Rupar). He concluded that the new discovery extended the zone of the Harappan Civilization to the *doab* between the Sutlej and the Yamuna.

The site was partially excavated again in 1955 by the present writer (Sharma 1971, 1976). Measuring approximately 260 meters east-west and 100 meters north-south, the site may be divided into two contiguous sectors: the western covered by the present village, and the eastern outside it (Fig. 13.2). The latter with one meter of deposit, abounds in typical Mature Harappan pottery: e.g., dish-on-stand with "drum"-shaped stem, scored Indus goblet with pointed base, elliptical footed goblet, shallow flat dish (*thali*) with flaring sides, wide-mouthed large storage jar with concave profile above the base and a cup with a perforated handle (Figs. 13.3 and 13.4). Bara Ware is present here in small amounts in the upper layers and on the surface. In the two-meter thick western sector Mature Harappan pottery is associated with Bara Ware from the bottom to top. The two sectors could not be linked by a connecting trench. It seems, however, that initially, in Phase I, the Harappans occupied the eastern area, but with the advent of the Barans, in Phase II, a large settlement grew in the western area.

Fragmentary walls of standard-sized kiln-burnt bricks occur all over the site. In one trench in the western sector they were assigned to four structural phases. In the eastern sector there were four small oval kilns or furnaces in a row (Pl. 13.1). Small objects were perhaps baked here; although only fragmentary terracotta bangles were picked up from them. The small objects of common use include bangles of terracotta, faience, steatite paste and bone; beads of faience, paste, shell and semiprecious stones, including carnelian; blades and a weight of chert; triangular terracotta cakes, animal figurines, cart frames and wheels, antimony rods; and a ring, and pins of copper.

DHER MAJRA (lat. 29°55′ north; long. 70°50′ east)

Dher Majra, known as Bikkun in the earlier records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Lahore
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NAGAR
KATPALON
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KOTLA NIHANG
Ludhiana
R. BEAS
Faridkot
RAJA SIRKAP
HARAPPA
BHUDAN
SANGHOL
DADHERI
SARANGPUR
CHANDIGARH
OLD BED OF R. SUTLEJ
W. NAIWAL
Bhatinda
C. NAIWAL
E. NAIWAL
BHAGWANPURA
BARGAON
R. GHAGGAR
DAULATPUR
KURUKSHETRA
MIRZAPUR
HULAS
BANAWALI
KALIBANGAN
BALU
RAKHIGARHI
R. YAMUNA
SOTHI
R. CHAUTANG
SHERPURA
SISWAL
ALAMGIRPUR
Meerut
MITATHAL
Delhi
Delhi
Jaipur
Area of Map
km 0 800
HARAPPANS IN NORTH INDIA
40 0 40 80 120 160 200 km
■ Modern towns

Fig. 13.1. Map of Harappans in North India.

of the Archaeological Survey of India, is on an arm of a monsoon rivulet known as the Kanahan Nadi, which together with the Sirsa, joins the Sutlej five kilometers northeast of Ropar. The site was discovered by Munshi Sadar Din, perhaps in the thirties. It measures 105 meters by 90 meters. Soundings were made there by Olaf Prufer in 1951. He felt that the settlement had not only the remains of the Harappan Culture, but also a number of Post-Harappan Phases, among which he included the Cemetery H Culture. On reassessment, Prufer's material from Dher Majra is mainly from the Bara Culture, with some new types of the same category, as one finds at any excavated site. There is neither Cemetery H pottery, nor any Mature Harappan pottery or other objects. Out of the 1200 beads found at Dher Majra, agate accounts for the largest number, although carnelian, emerald, crystal, lapis lazuli, steatite and faience are also present. Faience bangles occur in large numbers, as at Bara. Toy cart wheels, some with raised hub, mar-

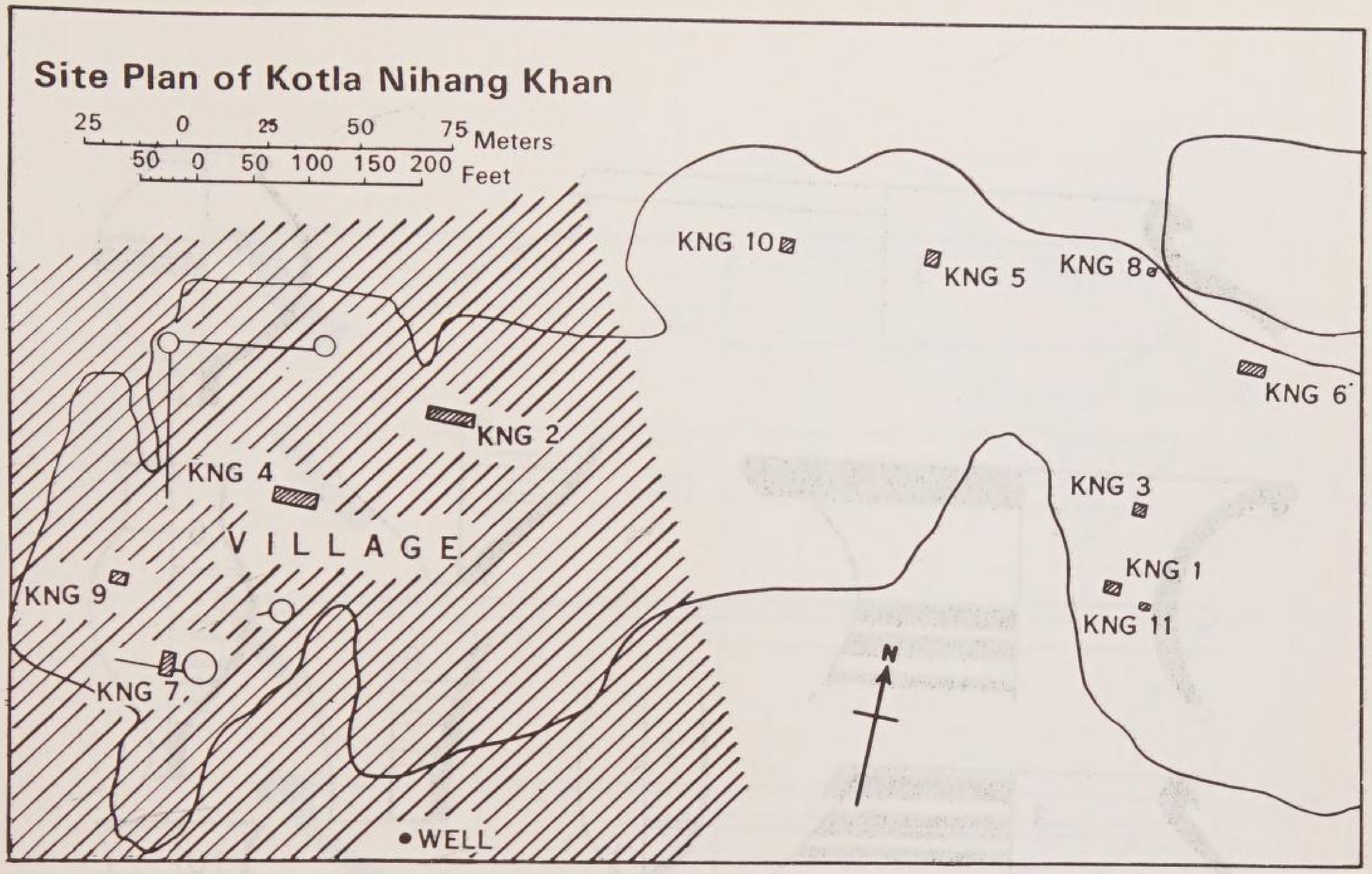

Fig. 13.2. Kotla Nihang: Site plan.

bles, gamesmen, a human figurine and a fragmentary animal figurine are among the terracotta objects. No terracotta cakes were found by the excavator; although the present writer picked up some pieces from eroded sections of the site. Two brick sizes were recorded: 30.5 by 19 by 5 centimeters and 28 by 14 by 6.5 centimeters, the latter conforming to the standard Harappan size. Bronze or copper objects included rods, a fragmentary bangle and a toothpick with a hole. A bracelet with an incised design reported by the excavator from the top layer, may not belong to the original deposits.

BARA (lat. 30°17′ north; long. 76°47′ east)

Six kilometers southwest of Ropar, the mound at Bara lies on the left bank of a monsoon rivulet known as Budki Nadi. The ancient mound presently measures 550 meters north-south and 300 meters east-west. The present writer excavated some trenches here in 1955 and again in 1971 (IAR 1954–55a: 9–11; Sharma 1971, 1973, 1976, in press a). The four meters of deposit belong to one very distinct culture, although they may well be divided into lower, middle and upper levels.

It is the pottery of Bara that is most distinctive (Figs. 13.5 through 13.8). Made of well levigated, fine- to medium-grained clay, it is all wheel turned, with a self-slip or an applied slip, a dull brown in color. Designs are painted in dull chocolate or black, and are incised with wooden points or brushes (Fig. 13.6, nos. 30–40). Paring is present (Fig. 13.5, no. 17) but more characteristic is a technique of drawing designs with a blunt point on a smooth surface. These designs acquire a sheen or burnished appearance when fired (Fig. 13.8, nos. 60, 61, 63, 65, 69). Even the Harappans adopted this technique; although it does not appear to be in evidence in the Indus Valley proper. Cooking utensils or water jars are incised on the shoulder and rusticated at the base in a wet ware technique with honey-combed ridges, brushed spirals or finger patchwork (Fig. 13.6, nos. 30, 35, 37, 40).

Bara pottery has parallels with Harappan ceramics in thick wares, such as the dish-on-stand, basin or large bowl with flaring sides and a variety of rims including the undercut types, and large storage jars with bulging or bluntly carinated profiles. Thin sectioned pots like the oval or round vases with a disc base have a general resemblance to Harappan examples. While the majority of Harappan pottery is plain,

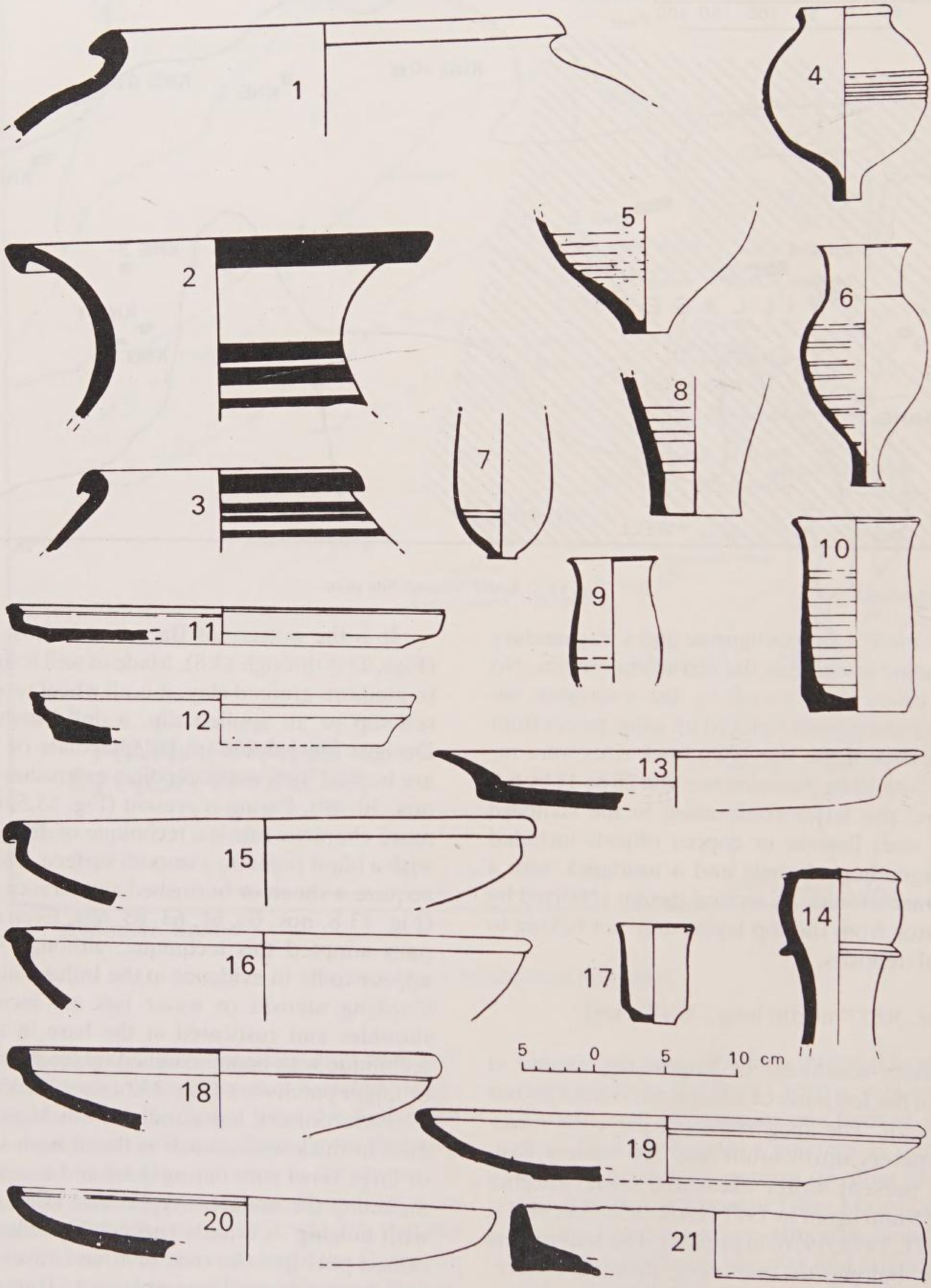
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Fig. 13.3. Kotla Nihang: Harappan pottery. Scale 1:4.

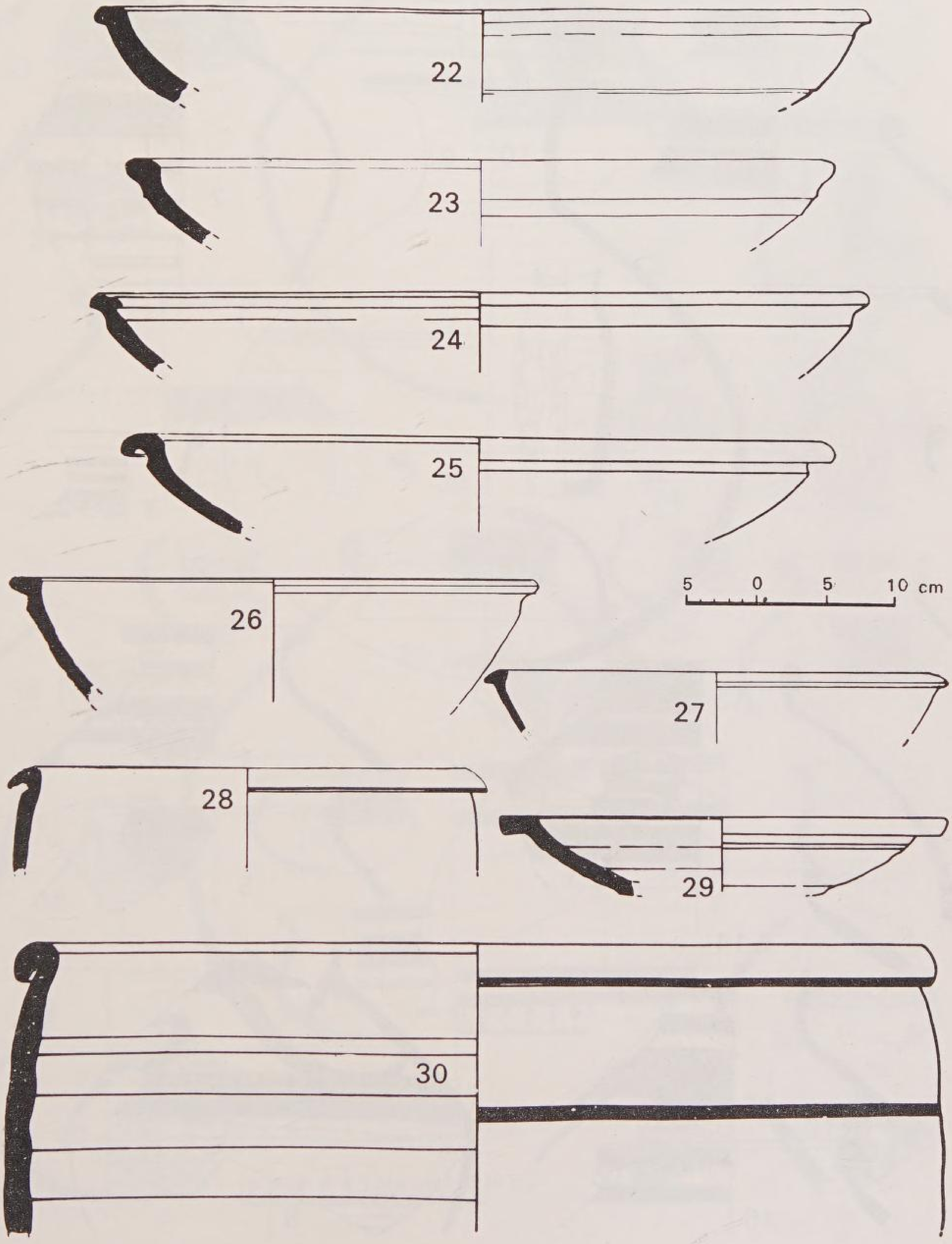
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Fig. 13.4. Kotla Nihang: Harappan pottery. Scale 1:4.

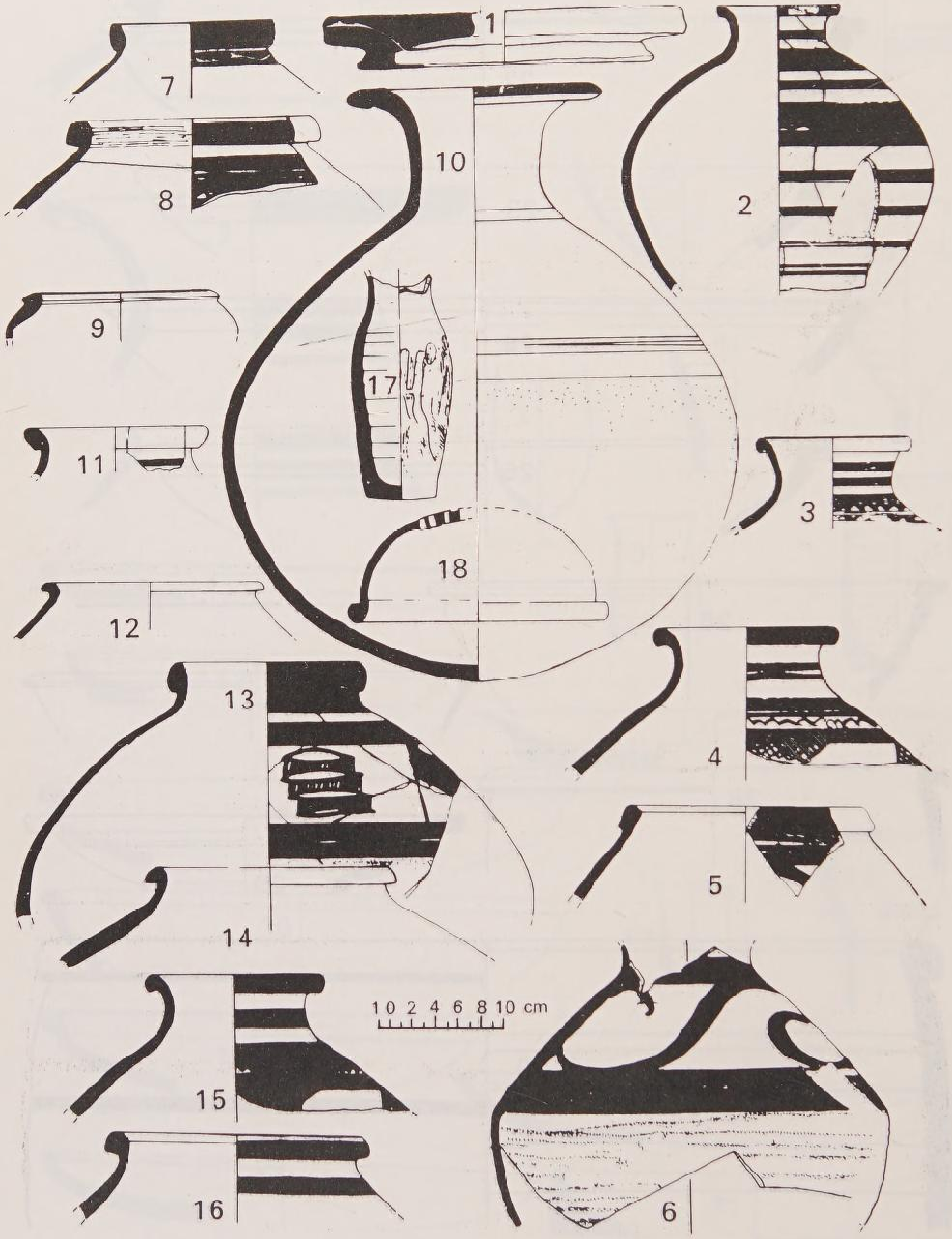
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Fig. 13.5. Bara: Pottery. Scale 1:5.

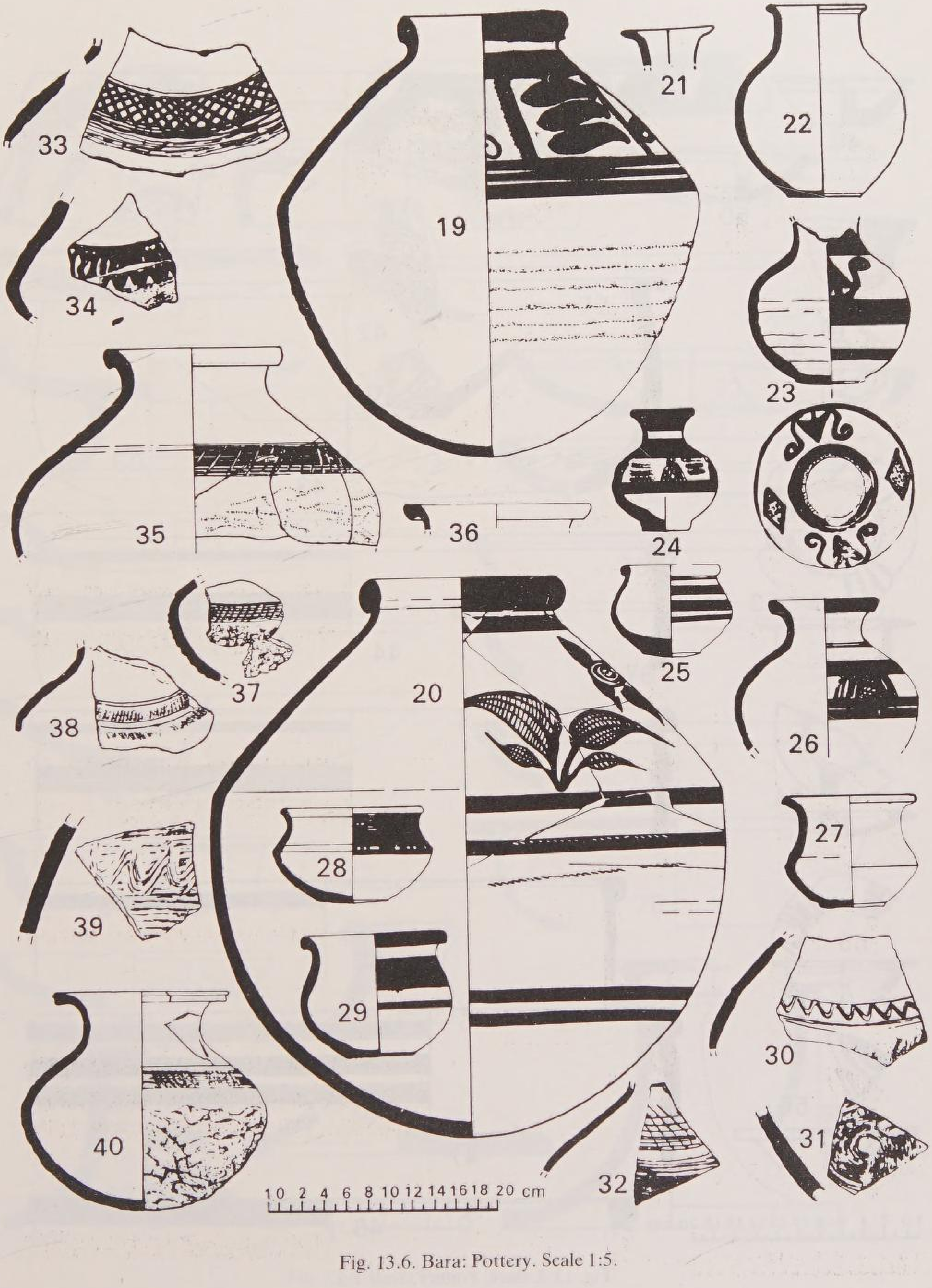
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Fig. 13.6. Bara: Pottery. Scale 1:5.

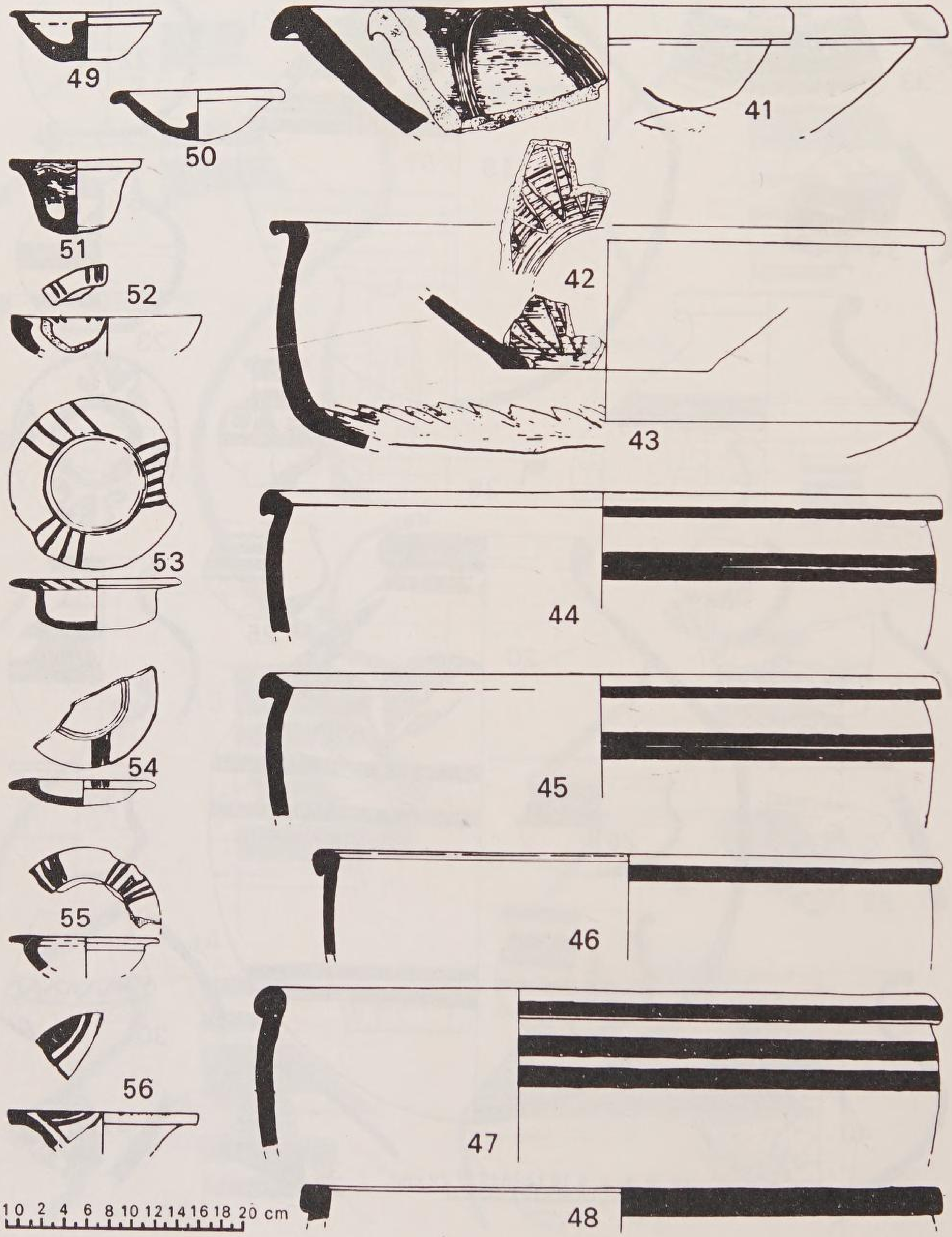
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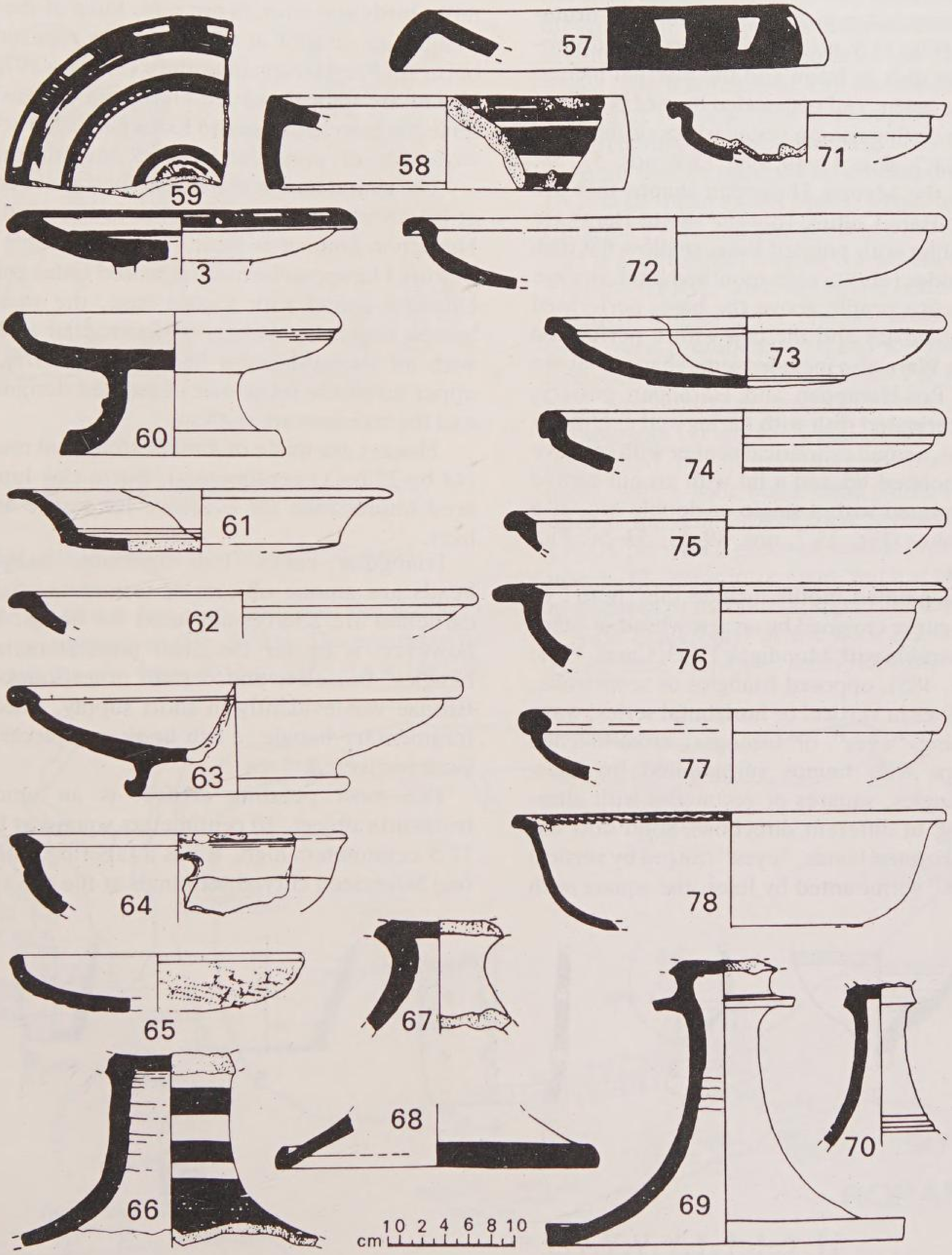
Fig. 13.7. Bara: Pottery. Scale 1:5.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cm 10 2 4 6 8 10

Fig. 13.8. Bara: Pottery. Scale 1:5.

undecorated pots are rare in the Bara assemblage. Even the parallel shapes have certain features which distinguish them from Harappan counterparts. For instance, the stem of the Bara dish-on-stand is short and wide (Fig. 13.8, nos. 60, 67), and even if long it has a projecting ledge in place of a plain or drum-shaped stem (Fig. 13.8, no. 69). The sloping or drooping rim of the dish or basin and the internal incised designs of the basin, and pedestaled base of bowl and dish are also distinguishing peculiarities of the Bara Ware (Fig. 13.7, nos. 41–49; Fig. 13.8, nos. 57, 58, 63). Among the Mature Harappan shapes that are absent in the Bara Culture (not the site of Bara) are the Indus goblet with pointed base, shallow flat dish with flaring sides (*thali*), wide-mouthed large storage jar with concave profile above the base, perforated jar, "S"-profiled jar and the cup with a perforated handle. Bara Ware also includes some shapes that are common in Pre-Harappan and Harappan pottery, such as the carinated dish with flaring and externally concave sides, a small cylindrical beaker with concave sides, the knobbed lid and a lid with an out-turned rim, often painted with a single or double arc, or a series of strokes (Fig. 13.7, nos. 49–51, 53–56; Fig. 13.8, no. 61).

The Bara painted motifs include the "horn" or "bowl"-like curve crowned by an arrowhead or other motif (comparable with Mundigak IV, 3; Casal, 1961: Fig. 102, no. 485), opposed triangles or semicircles, "willow" leaves in vertical or horizontal series, wavy lines enclosing "eyes" or lozenges, cross-hatched "nets," loops with humps surmounted by lines, grouped triangles, squares or rectangles with alternate hatching in different directions, solid dots enclosed by horizontal bands, "eyes" fringed by vertical lines, "wings" surmounted by lines, the square with "bastions" or scrolls at corners, chain and plain wide band at the neck. The petaled rosette, a twig with needle leaves, the frond, an unidentified oval leaf with a long, pointed tip (Fig. 13.6, no. 20) and a plantain-like tree provide floral motifs. Fish are common; birds and animals are rare. Most of the painted designs are absent in the Harappan repertoire, but occur on Pre-Harappan pottery (Sharma 1973). Also absent are typical painted Harappan designs like intersecting circles, opposed loops enclosing a "cross"-shaped motif, *pipal* leaf, peacock and fish scale.

The characteristic ware described above is present at Bara from bottom to top, but in the middle levels Harappan contact is clear. There are some distinct Mature Harappan forms: the scored Indus goblet, the elliptical goblet with footed base, the vase with a button base, the beaker, perforated jar and a sieve with an animal-headed handle (Fig. 13.9). In the upper levels the repertoire of painted designs is poor and the incisions are shallow.

Houses are made of *kankar* stone and mud bricks (44 by 22 by 11 centimeters). Burnt clay lumps with reed impressions are evidence for wattle and daub huts.

Triangular cakes, bull figurines, bangles and beads are among objects of terracotta. Agate and carnelian are additionally used for beads. Faience, however, is by far the most popular material for bangles, bracelets and certain other knick-knacks. Bronze was evidently in short supply, since only a fragmentary bangle, a fish hook and pieces of wire were recovered.

The most puzzling artifact is an unidentified terracotta object, 10 centimeters square at base and 17.5 centimeters high. It has a tapering outline with two bifurcated curved terminals at the top and three

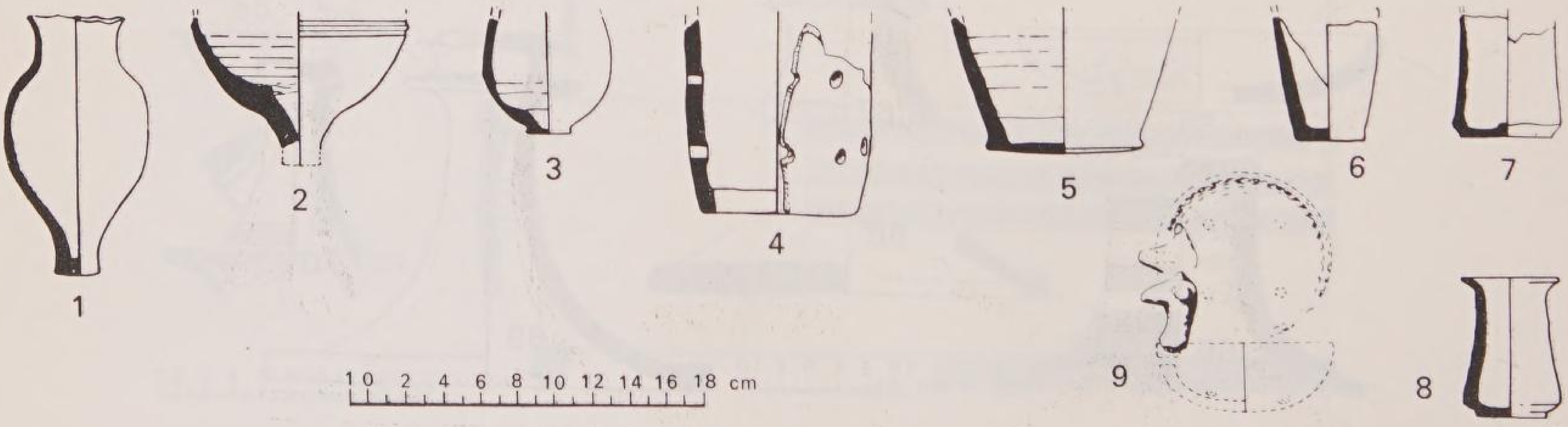

Fig. 13.9. Bara: Harappan pottery.

finger depressions on the front and back (Fig. 13.10). The object is also reported from Sanghol and Chandigarh.

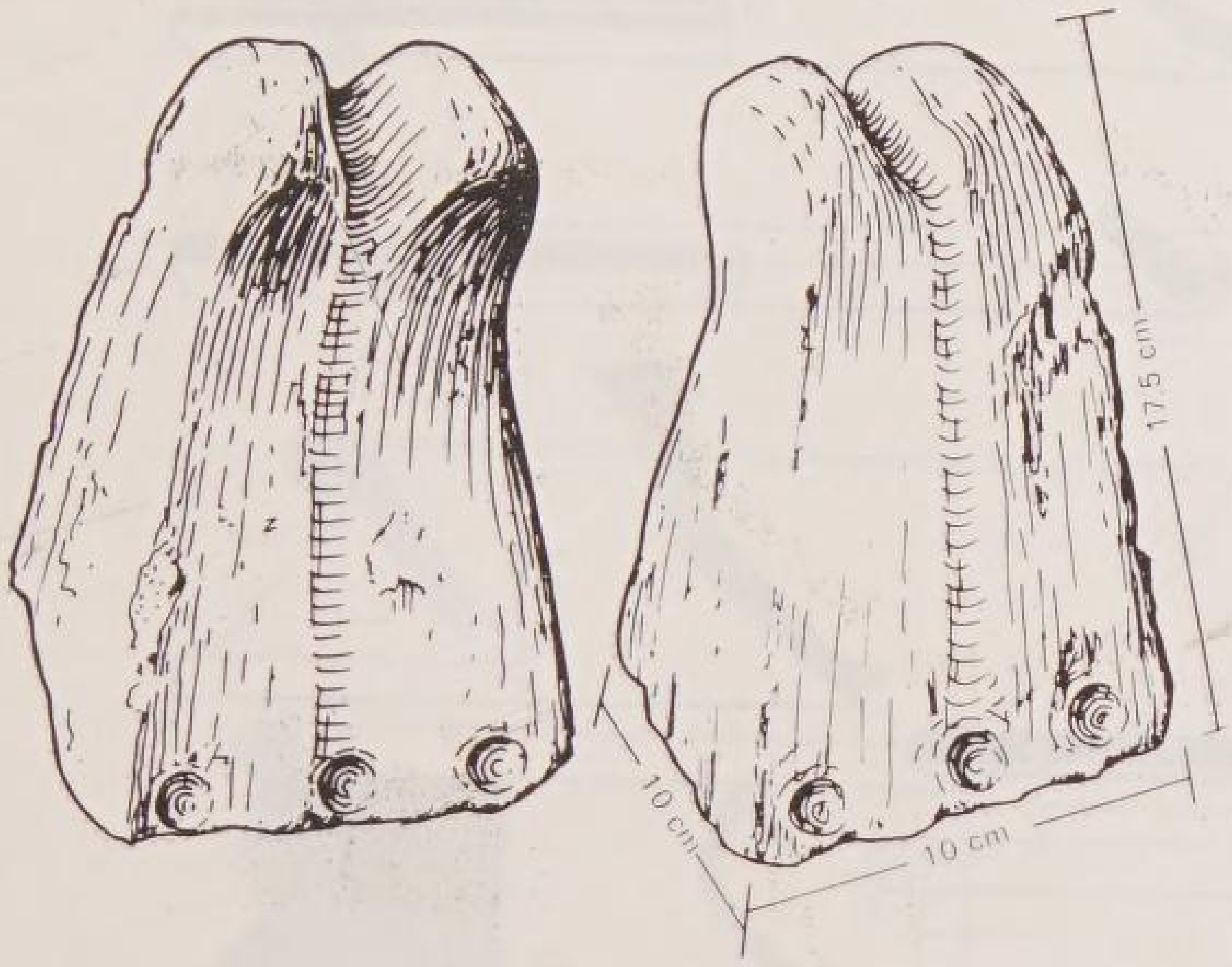
17.5 cm
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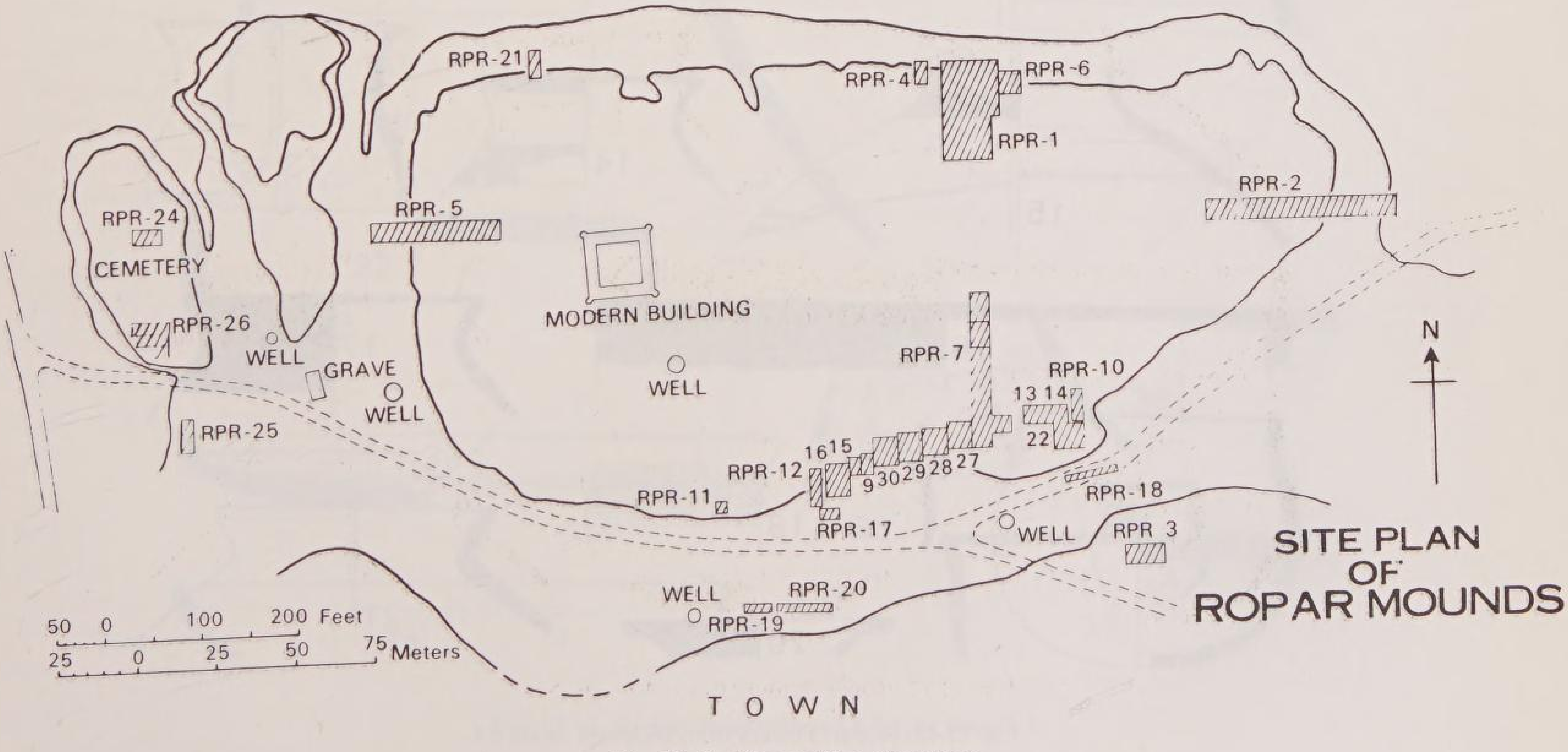
Fig. 13.10. Bara: Unidentified terracotta object.

ROPAR (lat. 30°58′ north; long. 76°32′ east)

The site of Ropar has three mounds: the northern, southern, and western (Fig. 13.11). The present writer excavated the site from 1953 to 1955 (IAR 1953-54: 6–7; 1954–55b: 9; Sharma 1955–56, 1976). Over the southern mound rises the present town, and it could be tapped only marginally. The small western mound conceals the Harappan cemetery, largely disturbed by later occupants. It is the northern mound, 21 meters high, that was excavated at several points. The operations yielded a sequence of six periods; of which, one is concerned with the lowest one here.

Ropar I is described as Harappan, but the variation of contents and/or emphasis in its different levels suggests that its deposits be divided into two phases, IA and IB. In an earlier paper I suggested three phases (Sharma 1976), but one of these is a sectoral variation and it is better not to give it a separate designation. Trench RPR-1, and its lateral extensions on the northern fringes of the mound, produced the lowest two layers, (numbered 35B and 35A) in a representative section. These strata yielded Pre-Harappan pottery, particularly examples of Fabrics A, B and D of Kalibangan I (Figs. 13.12 and 13.13). These levels are designated IA. A medium-sized vase of matt red ware, with a wide black band painted at its concave neck is the hallmark of these levels (Fig. 13.12, no. 17). A jar with a grooved middle profile (Fig. 13.12, nos. 9, 12, 19) is infrequent, but has to be taken note of because of its Pre-Harappan affiliation. Vases with a wide black band at the neck are characteristic of Predefense Harappa, Amri, Kot Diji I, Sarai Khola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CEMETERY
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RPR-5
MODERN BUILDING
WELL
RPR-7
RPR-10
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16 15
RPR-12
9 30 29 28 27
RPR-18
RPR-11
RPR-17
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SITE PLAN OF ROPAR MOUNDS
50 0 100 200 Feet
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TOWN

Fig. 13.11. Ropar: Plan of mounds.

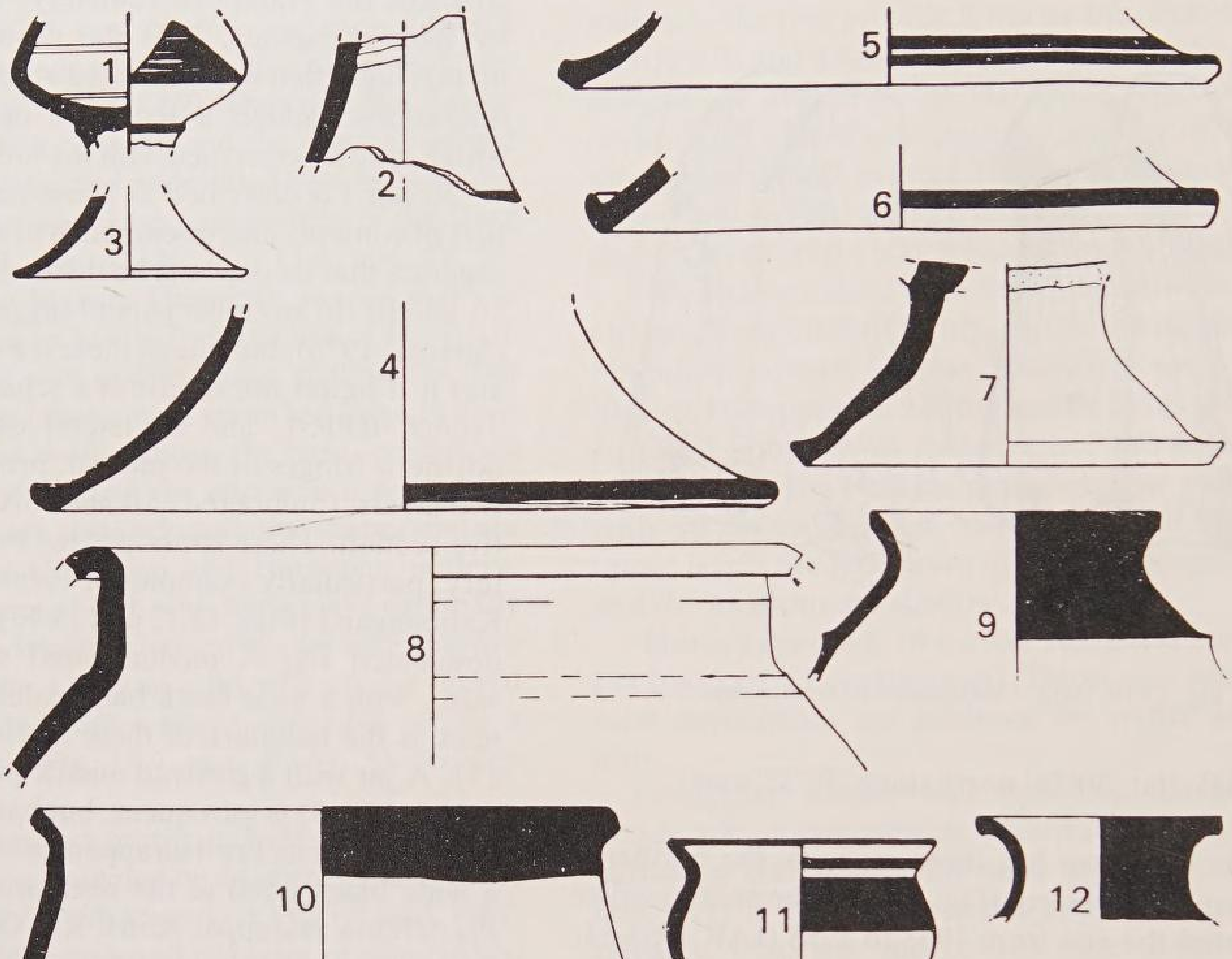
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Fig. 13.12. Ropar: Pottery from IA levels. Scale 1:4.

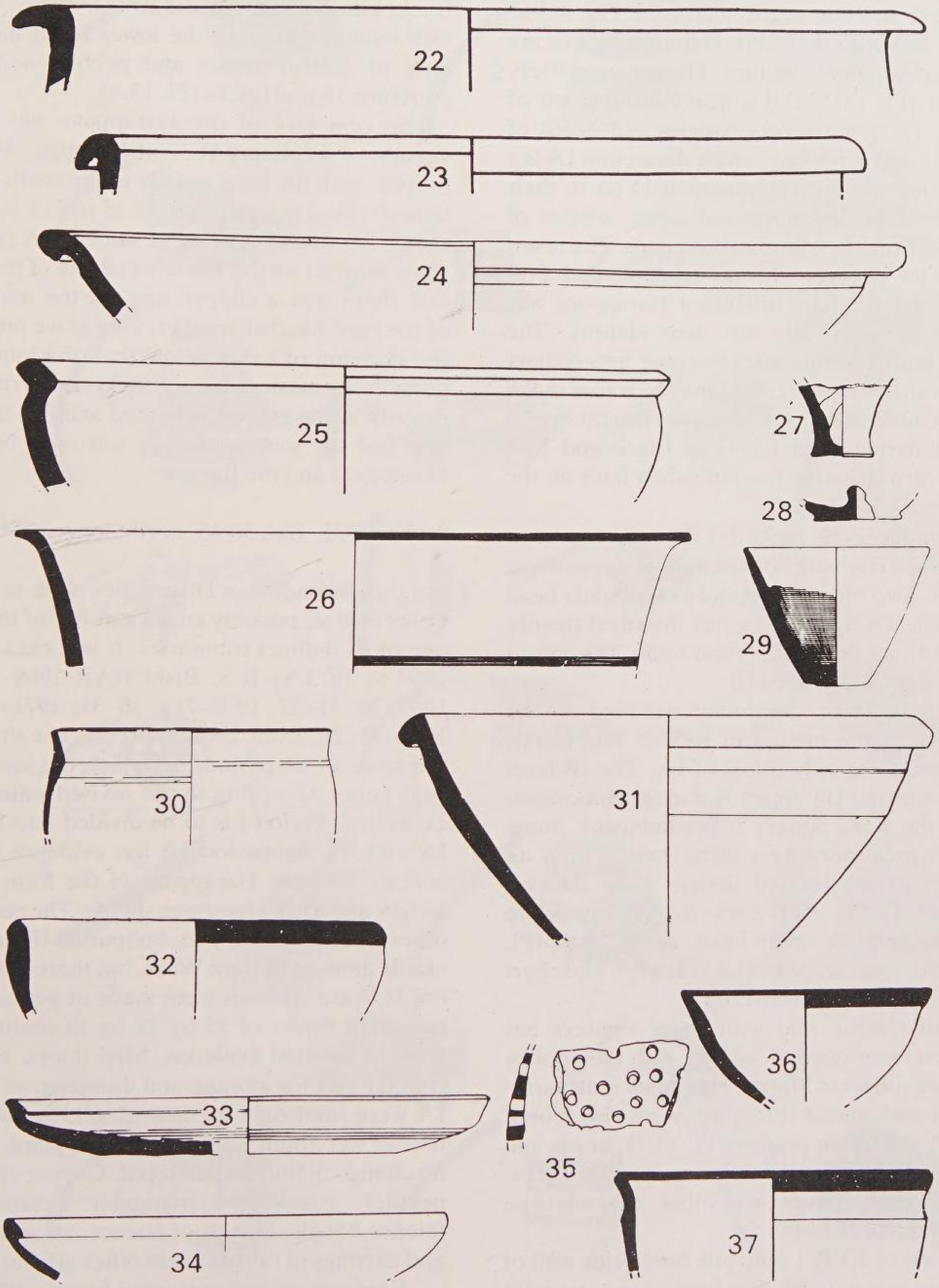
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Fig. 13.13. Ropar: Pottery from IA levels. Scale 1:4.

II, Kalibangan I and Siswal. They are also reported from Mohenjodaro. Jars with grooved bodies or shoulders are reported from Predefense Harappa, Sarai Khola II and Jalipur (Mughal 1973: Fig. 3, Pls. IV and V). But with these Pre-Harappan wares are also associated some Mature Harappan pottery forms, a jar (Pl. 13.2) and a heavy broken celt of bronze (Pl. 13.3), terracotta bangles and beads of steatite paste and carnelian, which shows that IA is a phase in which the Pre-Harappans held on to their pottery, but they had borrowed other articles of everyday use from the Mature Harappans. The result of the contact between the poorly equipped Pre-Harappans and the fully urbanized Harappans was that the former gradually lost their identity. The Harappans had probably already come into contact with the Barans, whose presence may be traced in the pottery ensemble of IA. An intrusive element can be detected in flaring-sided bowls of Black and Red Ware, one of which also has burnished lines on the interior (Fig. 13.13, no. 29).

Above the IA levels in RPR-1 the pottery assemblage is a mixed one with both Mature Harappan and Bara Wares. Two bronze celts and a small spear head (Pl. 13.3), chert weights and a tiny inscribed steatite seal (Pl. 13.4) are other important finds. This mixed stratum has been designated IB.

Phases IA/IB were also found stratified on the eastern slope of the mound in RPR-2. But in this location there were only traces of IA. The IB level had, again, a mixed Harappan-Baran ceramic assemblage; but the Bara pottery is predominant. Some idea of this predominance can be gained from an examination of the painted designs from the two trenches (Fig. 13.14). RPR-2 was particularly rich in bronze and chert. A spear head, arrow head (Pl. 13.3), bangle, ring, razor blades (Pl. 13.5) and chert weights and cores were recovered.

The small steatite seal with script symbols has already been mentioned. A sealing with the impressions of three different Mature Harappan seals carrying the bull and legend (Pl. 13.6), were also found. Indus script graffiti on pottery (Pl. 13.7), beads and bangles of faience, triangular terracotta cakes, wheels and cart frames are other characteristic Mature Harappan objects.

In IA levels of RPR-1 only one mud brick wall of three courses was noticed. The bricks were irregular in size, but had a uniform thickness of 10 centimeters. In RPR-2 a pebble wall was the only structural remain in the excavated area. But seven structures assignable to five phases were recorded in IB levels in RPR-l and its extension. They were differently built of mud brick, kiln-burnt brick and *kankar* stone. One of the well-built rooms from the lower levels had a plinth base of *kankar* stones and pebbles and a superstructure of mud bricks (Pl. 13.8).

The cemetery of the Harappans was a smaller version of Cemetery R-37 at Harappa. Most of the burials, with the head usually to the north-west, contained typical vessels (Figs. 13.15 and 13.16). Some of the skeletons had personal ornaments. A faience bangle was intact on the left wrist of one of the interred, and there was a copper ring on the middle finger of the right hand of another. One grave pit contained the skeleton of a dog below that of a human being, possibly its master. Bara pottery, occurring promiscuously in the graves, is limited and it is uncertain if one and the same cemetery was used both by the Harappans and the Barans.

SANGHOL (lat. 30°45′ north; long. 76°20′ east)

Sanghol in Ludhiana District lies close to a now dry water course, possibly an ancient bed of the Sutlej or one of its defunct tributaries. It was excavated from 1969 to 1973 by R.S. Bisht (IAR 1968–69: 25–26; 1969–70: 31–32; 1970–71a: 30–31; 1971–72: 39–40; 1972–73: 28; Bisht 1976, in press). The site yielded a sequence of six periods, of which the lowest is relevant here. According to the revised estimate of the excavator, Period I is to be divided into Subperiods IA and IB. Subperiod IA has evidence for limited contact with the Harappans in the form of a chert weight and a few Harappan sherds. The assemblage is otherwise non-Harappan. Subperiod IB has a considerable amount of Bara Ware, but there is also Cemetery H Ware. Houses were made of packed clay, but sun-dried bricks of 55 by 35 by 10 centimeters size were in isolated evidence. Mud floors, hearths and circular pits for storage and dumping, of Subperiod IA were sited right on natural soil. In Subperiod IB houses were built afresh on the old plans. There was no change in building material. Copper chisels, bone needles, round and triangular terracotta cakes, faience bangles, beads of faience, steatite and agate and earrings of faience were other articles found.

Excavations were resumed here in 1978 by G.B. Sharma, who confirmed Bisht's period sequence, but divided Period I into three Subperiods IA, IB and IC

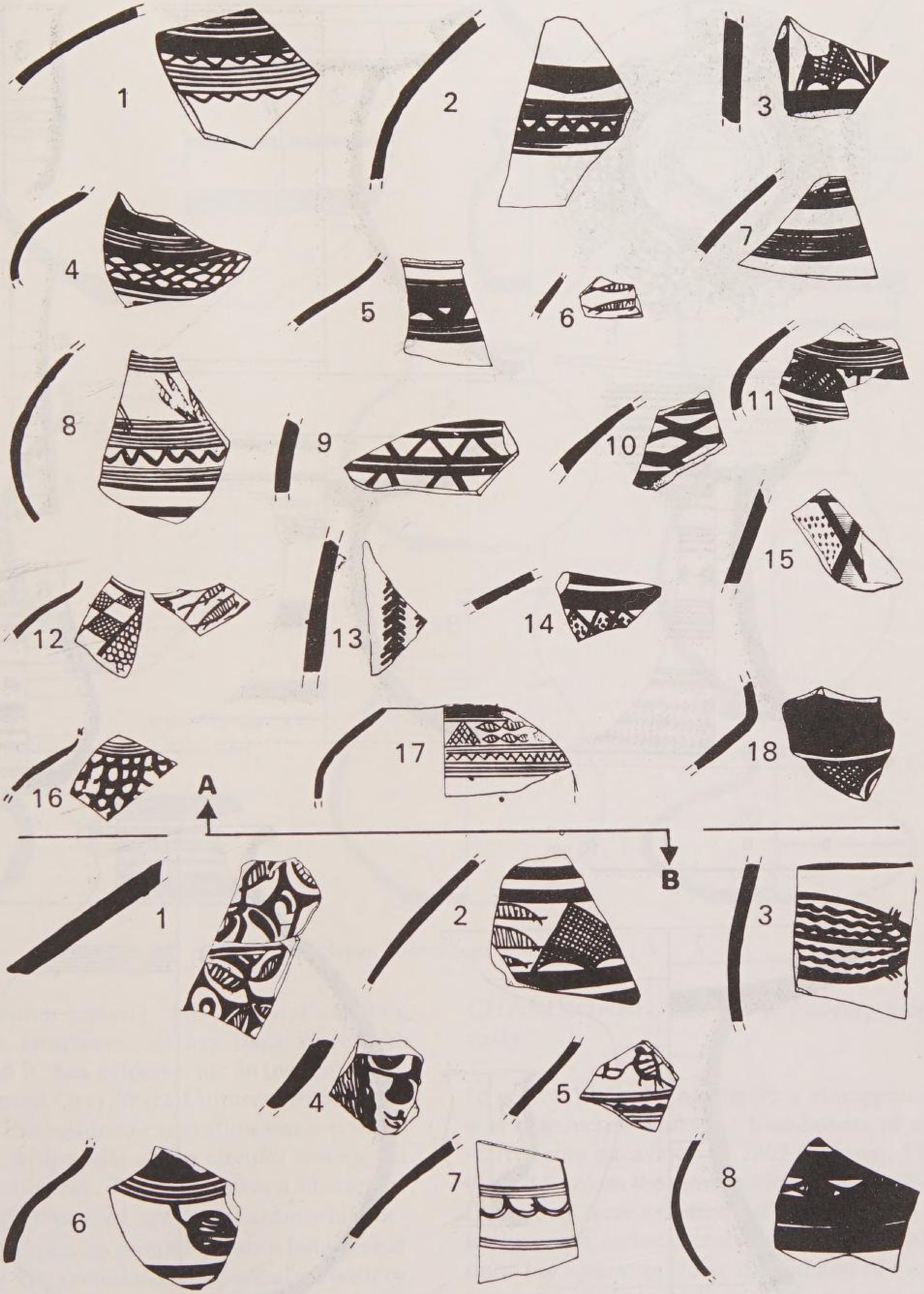
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Fig.13.14. Ropar: Painted designs from IBevels. Scale 1:4. A. from RPR-2; B. from RPR-1.

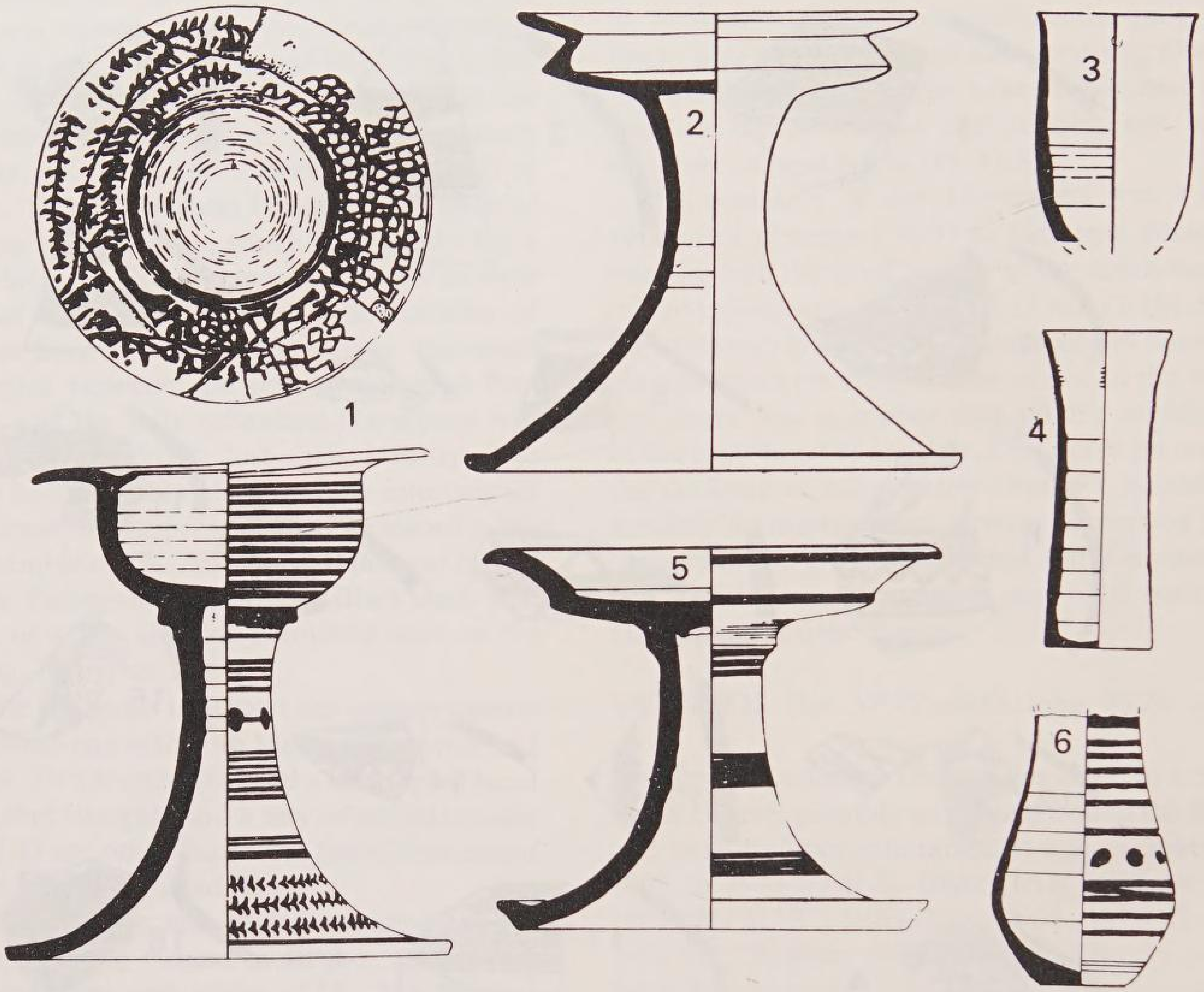
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Fig. 13.15. Ropar: Pottery from cemetery. Scale 1:4.

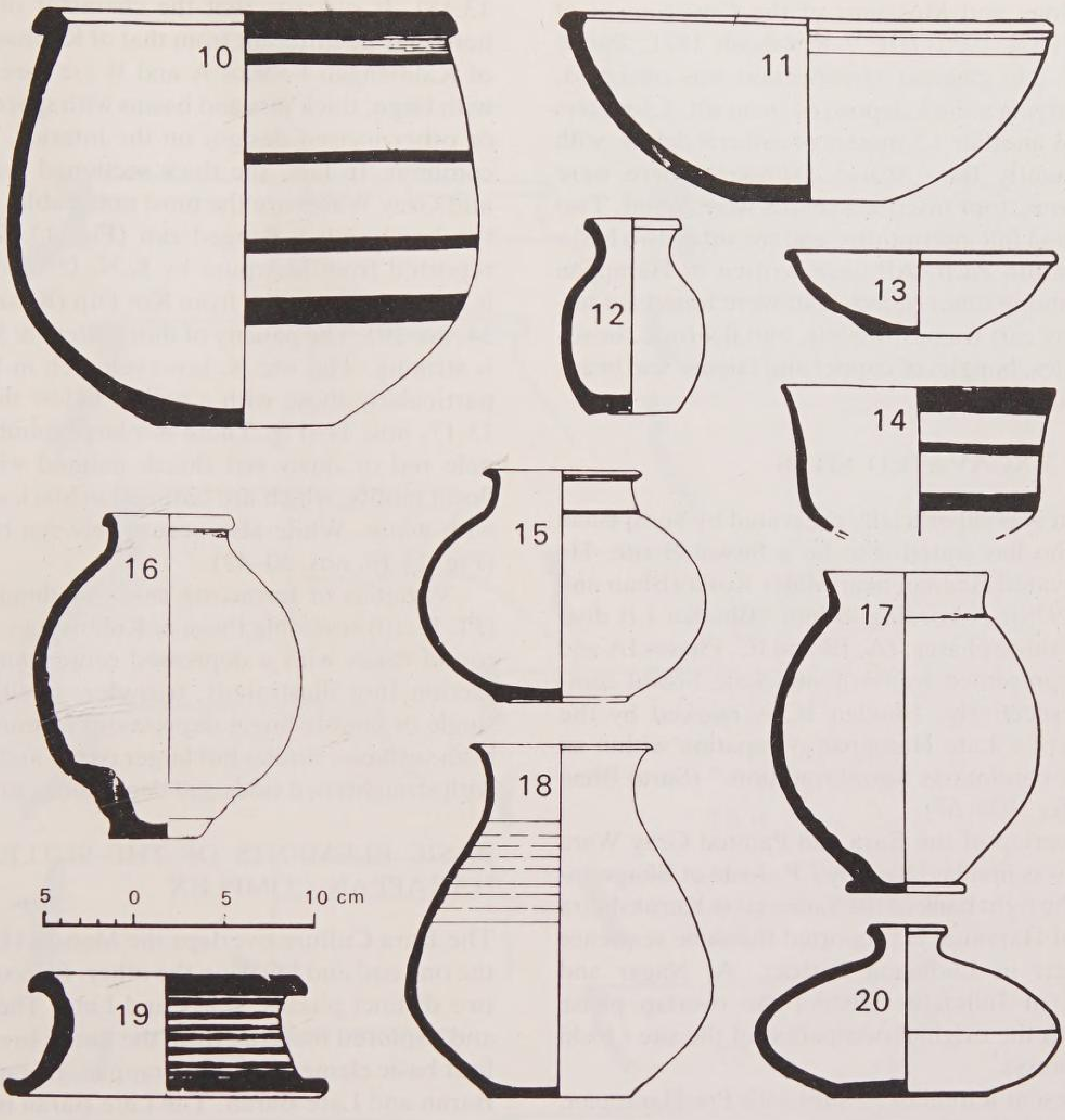

Fig. 13.16. Ropar: Pottery from cemetery. Scale 1:4.

(personal communication). His IA yielded Bara Ware without structures; IB has Bara Ware with structures; and IC has evidence for an overlap of the Bara and Painted Gray Ware Cultures. Particularly interesting in the resumed excavation was a potter's establishment with a kiln and a circular storage pit lined with mud bricks. There was also a furnace or fireplace, which was used again and again while debris continued to pile up around it over a long period (Pl. 13.9). The kiln contained some unbaked pottery and terracotta cakes. Three phases of sun-dried brick walls are also reported from the site. The bricks are 40 by 20 by 10 centimeters.

CHANDIGARH (lat. 30°40′ north; long. 76°50′ east)

In sector 17-C of Chandigarh a Harappan cemetery was discovered while the foundations of a building were being excavated in 1969 (Lalman, 1971). The burials were on the same model as those at Ropar; but the bodies were oriented north-south, with the head to the north. Subsequently, while digging the foundations for a parking place, the remains of a settlement came to notice at an adjacent site. Salvage operations were carried out here by the Archaeological Survey of India in collaboration with the Department of

Archaeology and Museums of the Government of Punjab (IAR 1970–71b: 7–8; Ghosh 1971; Pande 1972–73). No clearcut stratification was observed, but underlying a thick deposit of clean silt, 1.5 meters thick, was another 1.5 meters of cultural debris, with predominantly Bara Wares. Although there were vessel forms, four inscribed sherds were found. Two of these had full inscriptions, and the other two had a single graffito each. All were written in Harappan script. Among other objects that were found are terracotta toy cart frames, wheels, bull figurines, beads and bangles, bangles of copper and faience and beads of paste and agate.

OTHER EXCAVATED SITES

Sarangpur was superficially excavated by Suraj Bhan (1967) who has stated it to be a Siswal B site. He also excavated Bhudan near Maler Kotla (Bhan and Shaffer 1978). According to him "Bhudan I is divisible into three phases: IA, IB and IC. Phases IA and IB are represented by Early and Late Siswal complexes respectively. Bhudan IC is marked by the intrusion of a Late Harappan occupation within an otherwise continuous Siswal tradition." (Suraj Bhan and Shaffer 1978: 67).

An overlap of the Bara and Painted Gray Ware Cultures was first laid bare by J.P. Joshi at Bhagwanpura on the right bank of the Sarasvati in Kurukshetra District of Haryana. He reported the same sequence at Dadheri in Ludhiana District. At Nagar and Katpalon in Jullundur District the overlap phase began with the original occupation of the site (Joshi 1978, in press).

At present a total of 73 sites with Pre-Harappan, Harappan and/or Baran affinities are recorded in the Punjab (Madhu Bala 1978). Eleven of these lie south of the Ravi in the Amritsar and Gurdaspur Districts, perhaps along an older bed of the Ravi. Eight are along the East Bein, a tributary of the Sutlej. Thirty more are along the Sutlej and 34 along the Ghaggar. Some of the sites that are known are not on the list referred to above. Exploration is still in progress, and new sites still come on to the record from time to time.

Pre-Harappan pottery has been reported from Ropar, Sarangpur, Bhudan and Raja Sirkap. Raja Sirkap was first noticed in 1958–59 (IAR 1958–59: 73). The surface collection made from the site by G.B. Sharma has been examined by the writer through the courtesy of the collector (Figs. 13.17 and 13.18). It suggests that the character of settlement here may be different from that of Kalibangan I. Pots of Kalibangan Fabrics A and B are rare. Fabric D, with large, thick jars and basins with spaced grooving or other incised designs on the interior, is the most common. In fact, the thick sectioned forms in Red and Gray Wares are the most noticeable. A match of the bowl with a flanged rim (Fig. 13.17, no. 8) is reported from Sharpura by K.N. Dikshit (1980). It is comparable to one from Kot Diji (Khan 1965: Fig. 24, no. 10). The paucity of thin pottery at Raja Sirkap is striking. The site is, however, rich in bowl forms particularly those with a hollow below the rim (Fig. 13.17, nos. 11–17). There is a large number of thick pale red or dusty red sherds painted with leafy or floral motifs, which are outlined in black and filled in with white. White also occurs between black bands (Fig. 13.18, nos. 40–42).

Varieties of terracotta cakes or flinging missiles (Pl. 13.10) resemble those at Kalibangan. These are: round cakes with a depressed center and lenticular section (not illustrated), triangles, small ovals with single or double finger depressions forming a grip on both surfaces, similar but larger types, and large ovals with straightened sides and depressions for a grip.

BASIC ELEMENTS OF THE SUTLEJ HARAPPAN COMPLEX

The Bara Culture overlaps the Mature Harappan on the one end and PGW on the other. It accordingly has two distinct phases: Early and Late. The excavated and explored material from the Sutlej breaks up into four basic elements: Pre-Harappan, Harappan, Early Baran and Late Baran. The Late Baran is succeeded by the Painted Gray Ware Culture. Each of these elements exists either singly, or in combination with one of the remaining elements, with the result that a variety of cultural complexions are produced. These are broadly:

1) Pre-Harappan
2) Pre-Harappan plus Harappan
3) Early Baran
4) Harappan plus Early Baran
5) Late Baran
6) Late Baran plus Painted Gray Ware

PRE-HARAPPAN

Two facets are present in the Pre-Harappan: genuinely Pre-Harappan, and a mere survival in later times.

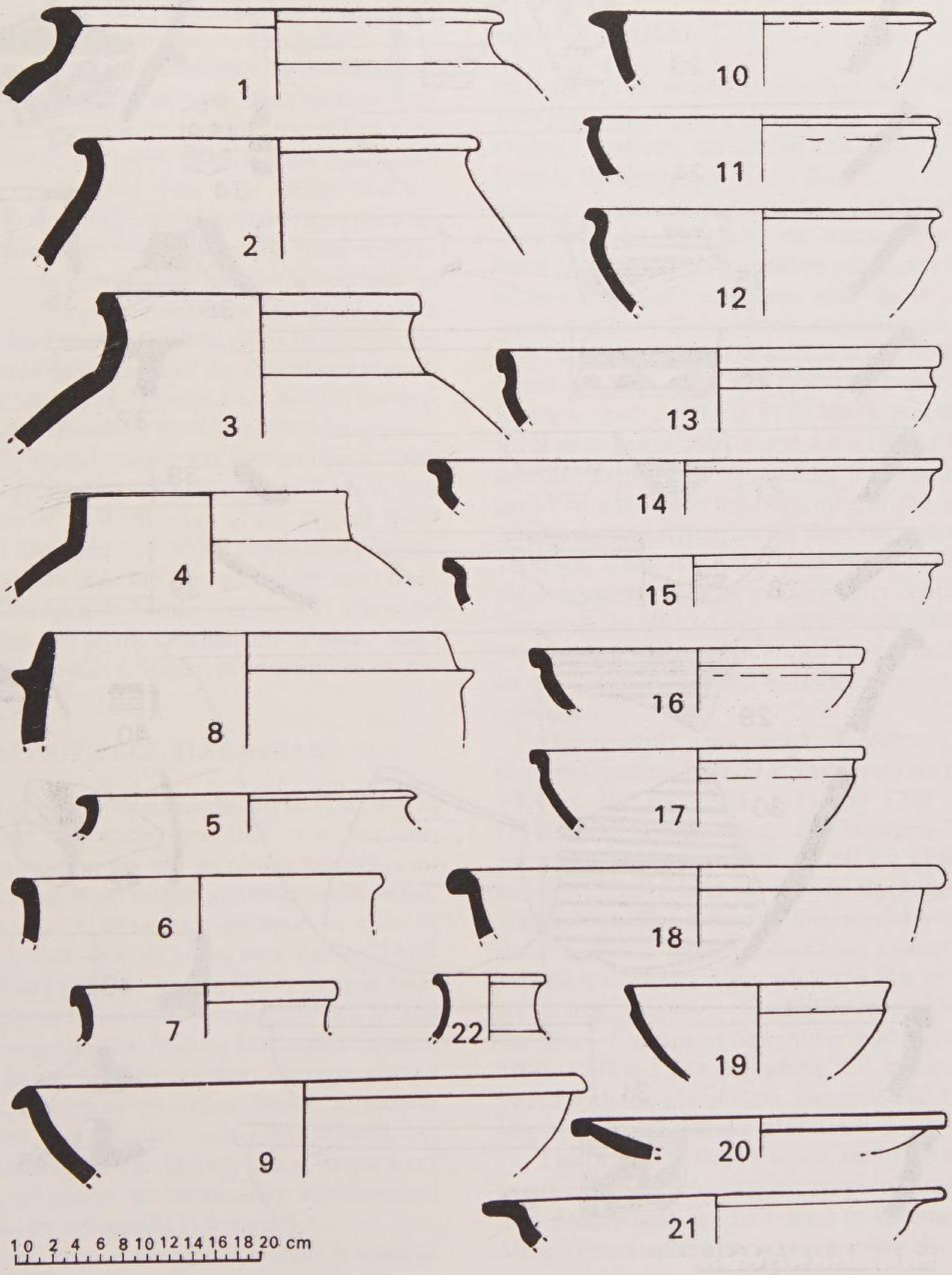
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Fig. 13.17. Raja Sirkap: Pottery from surface exploration. Scale 1:5.

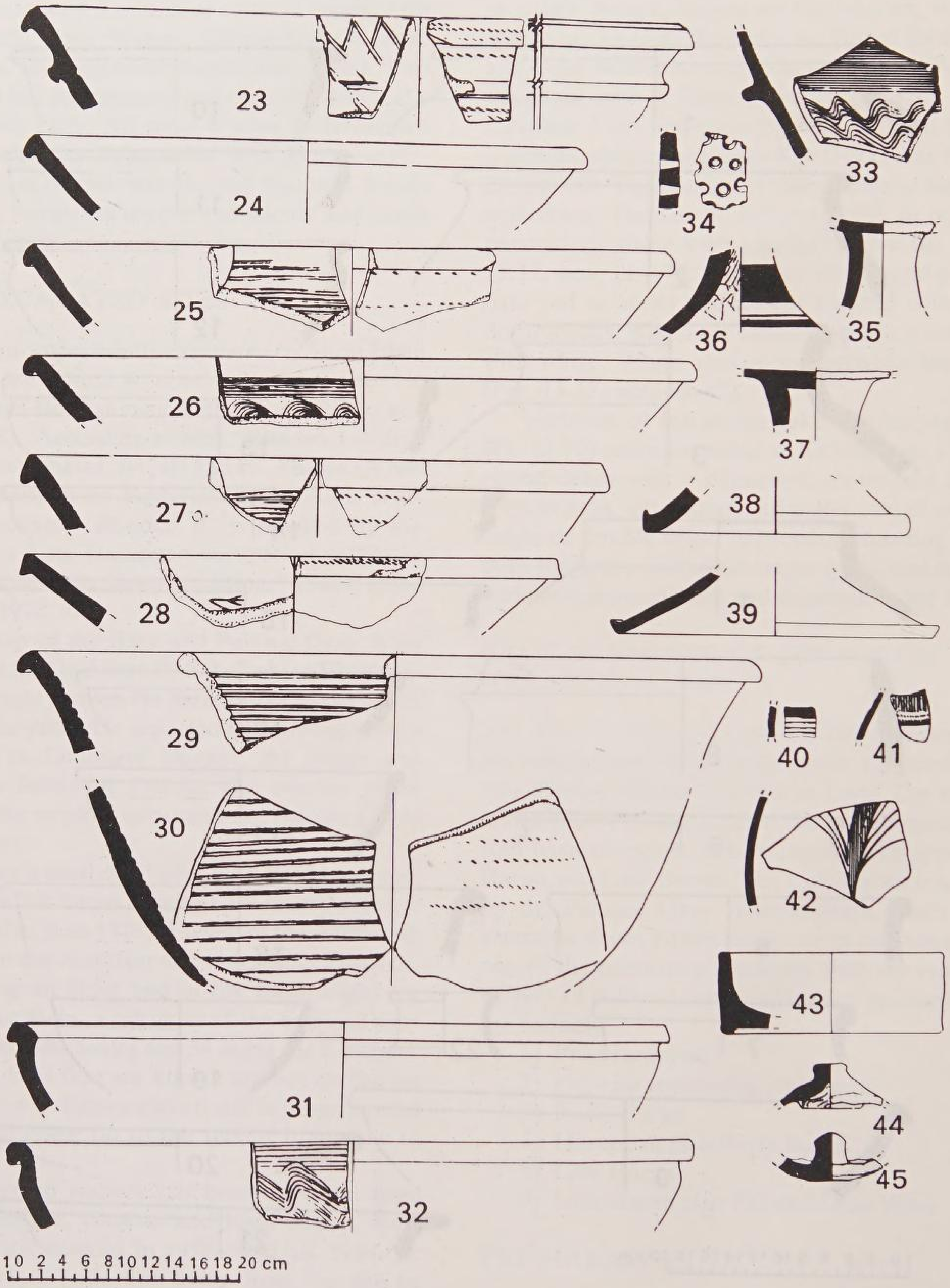
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Fig. 13.18. Raja Sirkap: Pottery from surface exploration. Scale 1:5.

Among the sites so far excavated, Suraj Bhan reports the occurrence of Early and Late Siswal from Budhan (Suraj Bhan and Shaffer 1978: 67 n.) and from Sarangpur (Suraj Bhan 1967). Suraj Bhan and Shaffer (1978: 62) have also reported the discovery of Balu in District Jind, Haryana. This site is currently being excavated by a team from Kurukshetra University. They have found a continuous Pre-Harappan deposit from bottom to top, with some contact with the Mature Harappan in the middle levels and with the Baran in the upper levels (personal discussion and examination of material with U.V. Singh and his colleagues). It would appear, therefore, that the Pre-Harappan tradition exemplified by the Sothi or Kalibangan I Culture survived to late times, perhaps in isolated places. Sarangpur may also represent such a survival. As for Bhudan IB, Bhan and Shaffer themselves suggest concomitance of the Siswal and Mature Harappan occupations. If that be so, neither Sarangpur nor Bhudan IB can be genuinely Pre-Harappan.

As already stated, the writer had an opportunity to examine the surface collection from Raja Sirkap in the custody of G.B. Sharma of the Punjab State Archaeology Department. This is apparently a proper Pre-Harappan site; but of a genre different from Sothi of Kalibangan I. While Kalibangan I may be typical of the Sarasvati-Drishadvati region, Raja Sirkap may represent a different movement of the Pre-Harappans.

PRE-HARAPPAN PLUS HARAPPAN

This phase has so far been identified only at Ropar level IA. The indications are that it is the Pre-Harappan habitation on the northern periphery of the site, which has been largely cut away and leveled. The pottery has a close resemblance to that of Kalibangan I, but also includes new forms. Thick sherds with black painted leaf or flower designs filled with white appear to be more popular at Raja Sirkap than at Kalibangan. The Mature Harappan element in Ropar IA is provided by pottery, a bronze jar and celt, steatite, carnelian and agate beads, terracotta cakes, bangles and toy cart frames and wheels. As mentioned earlier, the Pre-Harappans at Ropar were probably a rural group, whose need for sophisticated goods was met by urbanized Harappans.

So far, there is no evidence for a defense work at Ropar. But, with the southern mound still uninvestigated, one does not know if it conceals a twin settlement, as at Kalibangan, Banawali and Rakhigarhi, with or without a defense wall.

A house wall of mud bricks of irregular size, but the uniform thickness of 10 centimeters, conforming to the thickness of Harappan bricks, lends support to the dual character of the first culture at Ropar.

EARLY BARAN

In theory, one would expect that there should exist sites with pure Mature Harappan content in the Sutlej region; however, no site of this type has yet been found. Presently the Early Baran, in more or less unmixed form, is known at Bara and Sanghol, where only limited contact with the Mature Harappan has been identified. The painted motifs on the Bara Ware have exceptional closeness with those on pottery from northern Baluchistan and with certain other Pre-Harappan sites. The middle levels of Bara are ^{14}C dated to 1890 ± 95 B.C. (TF–1205) and the upper levels to 1645 ± 90 B.C. (TF–1207). Another middle level date reads 1845 ± 155 B.C. (TF–1204). Adding another century to the middle level date, so as to arrive at a date for the beginning of the occupation, even a conservative span for Bara site would be 2000–1600 B.C. There is a not unreasonable likelihood that the beginnings may be even another century earlier. These dates also receive confirmation from the fact that typical Mature Harappan shapes occur at Bara as an intrusive element only from the middle levels upward.

The recently announced ^{14}C dates for Sanghol (communication from D.P. Agrawal) range between 1900 ± 160 B.C. (PRL–511) and 1700 ± 150 B.C. (PRL–510) in one trench, and between 1730 ± 160 B.C. (PRL–509) and 1690 ± 160 B.C. (PRL–513) in another. These lend support to the suggested Bara chronology. The excavator informs the writer that the date of 1690 ± 160 B.C. comes from a sample from the middle levels of Period I, while the date of 1900 ± 160 B.C. is from the lowest level. The reasonable span for the Bara Culture at Sanghol would accordingly be 1900–1500 B.C. On the whole this means that compared with the site of Bara, Sanghol might have had a slightly later start and a later finish.

The origins of Bara Culture are by no means clear at present. Separate ceramic traits (potting technique and decoration) can be traced to Quetta, the Zhob Valley (particularly Periano Ghundai), Kot Diji, Pre-defense Harappa and certain other Pre-Harappan sites. This suggests that there is a substantial substratum of the Pre-Harappan tradition in its makeup

(Sharma 1973, 1976: 11). Some Baran pottery shapes have Mature Harappan analogs. The culture is absent on the lower Ghaggar, in the Ganganagar area, and is apparently characteristic of the Sutlej. On the present evidence wherever the Mature Harappan is found on the Sutlej, Bara pottery is found with it in a large or small percentage. This suggests that the Bara Culture runs parallel to the Mature Harappan; at least in the Punjab. At the same time let it be admitted that nowhere has it been found so far underlying the Harappan Culture.

It appears to be a rural phenomenon, which is complementary to the Mature Harappan. This is more than confirmed when considering the 73 sites in the Punjab noted above. If one omits the three with only Pre-Harappan affiliation, and another three where Mature Harappan dominates, 67 sites are left which have possible Bara ranking. One may assume that half of these were Early Baran, and the other half were Late Baran. This would suggest that against two or three towns, there existed more than 33 villages, which contributed to the economy of the former. The find at Ropar of a full-fledged sealing with impressions of three different seals suggests that Ropar was certainly a trading center of some importance. Its situation suggests that it may have received semi-precious stones and other minerals from the hills and may have participated in trade over a wider area.

One would be in a position to define the beginnings of the Bara Culture more accurately if one knew what position Bara holds on the Pakistan side of the border. It is possible that when the cognate Baluchi village cultures descended into the Indus plains, some produced the Urban Harappan society, and others developed into a complementary rural community. The latter may have lacked the luxuries of urban life, but were otherwise a strong element, particularly as producers of agricultural commodities. Continuing down the Indus, this community perhaps turned east along the Sutlej from the junction of the Indus and the Sutlej. Once it had established itself on the Sutlej, it extended south to the upper Sarasvati-Drishadvati area, where it intruded into the Pre-Harappan and Mature Harappan complex, as at Mitathal in IIB levels.

HARAPPAN PLUS EARLY BARAN

It was natural that the Harappans and Early Barans should occasionally converge. The two could live together, particularly because the latter were the agricultural producers, if not also suppliers of certain industrial goods (Sharma 1976: 12, in press b). The result was a pattern that is exemplified at Kotla Nihang, Ropar IB and Chandigarh. At Kotla Nihang, although in the eastern sector Bara Ware has not been noticed in the lower levels, it may be that it has eluded the excavator on account of limited operations. In the western sector, it occurs from the bottom to the top, alongside the Harappan. As shown at Ropar, where the Harappans and Barans lived together, each occupied a different sector of the settlement.

Even the Mature Harappan manifestation on the Sutlej apparently has two forms: one exemplified by Kotla Nihang and the other by Ropar. The difference is not merely one of large and small settlements, or of village and town aspects, or again, of one being earlier than the other; although these factors also count. The difference is in form. To illustrate, Kotla Nihang has a profusion of scored Indus goblets with a pointed base and the shallow dish (Fig. 13.3, nos. 4–5, 11–12). These have a parallel to the type proportions of pottery in the Indus cities. At Ropar the Indus goblet is not present at all, and the shallow dish has a different form, apart from its negligible percentage. The Ropar dish is shallower, with sides that tend to be vertical instead of flaring. The two sites lie within two kilometers of each other. Thus, the difference may be due to two movements of people being involved. Kotla Nihang may represent an earlier movement, perhaps along the Sutlej from its junction with the Indus, while Ropar may have been inhabitated by another folk wave from the lower Ghaggar region, possibly at a slightly later date.

Ropar IB has, however, almost all the objects with which one is familiar at Harappa and Mohenjo-daro. If terracotta figurines, including the Mother Goddess are absent at Ropar, this is also true in some measure of other peripheral settlements. Evidence for the layout could not be obtained because of a very restricted area being available for excavation in the lowest levels of a 21-meter high multiperiod site.

Chandigarh was not excavated methodically, the work there being in the nature of salvage operations. But with a cemetery of the Harappan R-37 type, and a mixed repertoire of Harappan and Bara pottery, it apparently represents the Ropar IB phase.

LATE BARANS

No site containing only the Late Bara Culture has been excavated so far in the Sutlej area. But some idea of its form may be obtained from Bhagwanpura, Dadheri, Nagar and Katpalon, where it overlaps with the Painted Gray Ware. In fact at Bhagwanpura and Dadheri, a preceding phase contains only Late Bara Ware without the association of the Painted Gray Ware. Daulatpur and Mirzapur in the Kurukshetra region may also represent a Late Baran phase (Singh 1977).

LATE BARAN PLUS PAINTED GRAY WARE

At Bhagwanpura on the Sarasvati, a devolved Bara Ware occurs in Subperiod IA. Mature Harappan pottery types are totally absent, nor are there any other objects of that category. Terracotta figurines, including a humped bull, beads of faience and semiprecious stones, bangles of terracotta and faience, and a few pieces of copper are present. Structural activity is evidenced only by platforms erected as protection against floods (Joshi 1978, in press).

There is smooth transition to Subperiod IB in which both the Barans and the Painted Gray Ware people seem to have lived together. The houses of this Subperiod can be placed in three phases: round or semicircular huts followed by mud-walled houses, and finally houses built of kiln-burnt bricks of five different sizes. None of the bricks conform to the Harappan size. Like pottery, articles of everyday use belong to both the cultures.

The excavator reports oval structures of burnt earth, not only from Bhagwanpura, but also from Dadheri, Nagar and Katpalon. To the present writer's mind, these are nothing but small kilns or furnaces like those at Kotla Nihang, Bara and Tarkhanwala Dera in District Ganganagar, although the kiln is made of mud bricks at the latter site.

G.B. Sharma reports an overlap of Bara and Painted Gray Wares from Sanghol. But the Bara Culture here evidences some contact with the Mature Harappans and ^{14}C determinations are fairly early. It is therefore reasonable to surmise that the people here were Early Barans. If so, it is difficult to imagine their overlap with the Painted Gray Ware people.

The devolution of the Bara Ware at Bhagwanpura is apparent from things such as the absence of certain typical early Bara painted motifs, the larger percentage of plain pottery and the introduction of new shapes such as small bowls or solid pedestaled cups with a concavity in base. These cups are absent at Bara proper, but do occur at Alamgirpur, Hulas and Bargaon in Uttar Pradesh.

THE TERM LATE HARAPPAN

"Late Harappan" is a much misused term today, since it has been indiscriminately applied to several pottery traditions in the Indo-Pakistan Subcontinent (Thapar 1975–76). The Bara Culture, without respect to its uncertain genetic relationship, and of the fact that it overlaps both the Mature Harappan and the Painted Gray Ware Cultures, is often labeled "Late Harappan." Such a loose application of the term, without a clearcut definition, creates much confusion. Early Bara, which overlaps the Mature Harappan, can in no way be Late Harappan. It has accordingly been suggested (Sharma in press a) that Late Bara be described as Late Harappan, but the Culture itself be known as Bara. This will ensure that definite assemblage of cultural elements is signified.

CHRONOLOGY

The beginning of Kalibangan I was ca. 2300 B.C. on the basis of ^{14}C determinations. It is reasonable to assume that the Pre-Harappans could have reached the Sutlej region by about 2200 B.C. At the other end, the latest Baran phase, which may be related to the Harappan Culture, albeit indirectly, overlaps Painted Gray Ware. Thus it cannot be much later than 1100 B.C. All the other phases of the Harappan complex on the Sutlej must have flourished within the time bracket 2200–1100 B.C. It is clear that the Early Barans and the Harappans in the Sutlej region were contemporary. At some sites, particularly in rural areas, the Barans lived alone. At other sites, notably the towns, the Barans and Harappans lived together. The following dates are tentatively suggested for the different phases of Harappan-related cultures on the Sutlej:

1) Pre-Harappan: 2200–2100 B.C.
2) Pre-Harappan plus Harappan: 2100–2000 B.C.
3) Early Baran: 2000–1400 B.C.
4) Harappan plus Early Baran: 2000–1400 B.C.
5) Late Baran: 1400–1200 B.C.
6) Late Baran plus Painted Gray Ware: 1200–1100 B.C.

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R.N. MEHTA

14. Some Rural Harappan Settlements in Gujarat

INDIAN tradition has evidence for a theory and practice of settlement patterns or organization. A perusal of Kautilya's *Arthashastra* is highly instructive in this matter. The author of this work has instructions for the construction of a royal residence at *Nisanta Pranadhih* in *Vinayadhikarana.* He discusses populating the country, the creation of commercial centers in the *janapadanivesa,* uses of uncultivable land, and the building of forts for protection. There is mention of populating these forts and towns in *janapadanivesa* and *durganivesa*. Military operations and camps, that is the *skandhavaras,* are considered in *sangramikam.* While discussing settlements in *janapadanivesa* he specifies that these villages should be established at a distance of a *krosa* or two so that they can afford mutual protection. These agricultural settlements should also have a population between 100 and 500 families.

Besides these largely agricultural settlements he notes the nonagricultural units appropriate to a territory. These units are tabulated as follows:

Villages	Nonagricultural establishments
800	80 *Sangrahanis*
	4 *Karvatika*
	2 *Dronamukhas*
	1 *Sthaniya*
800	87

In addition to these regulated villages, Kautilya notes outposts and forts, as well as habitats in the forest, isolated habitations on bad land, etc. There are also the nonagricultural habitations of students, teachers, soldiers, miners, traders and the like. As their number is not specified in the *Arthashastra* it can be assumed that they were created according to need. This would lead to more urban settlements.

The picture generated from the study of Kautilya's *Arthashastra* reveals some aspects of a rural urban dichotomy. This dichotomy was further imposed on Indian thinking by following a European model of towns in modern times. An interesting comparison is possible if one takes into consideration the separate existence of *Sangrahani, Karvatika, Dronamukha* and *Sthaniya*. The Indian experience is that these were not purely urban. This view is supported by Kautilya, who notes the presence of agriculturists near the *Durga* and other "urban" settlements. These references indicate the mixed nature of these settlements.

Taking these facts into consideration, the urban proportion of the Mauryan Empire would work out to have been about 10 per cent. This percentage might be made more accurate. It has already been noted that there were other human habitats with urban functions. Assigning some percentage for the settlements of teachers, soldiers, miners, etc., is essential. If one sets this at about five per cent one may not be far wrong, since these functions were carried out by only a small fraction of the population. It has been observed that some villages had one or two trading families, and the same may have been the case with other families of specialists. The other point is that they were not found in all villages. In sum, these features suggest that about five percent additional urban population is called for. These figures indicate that the urban population of the Mauryan Period was about 15 percent of the total. They depended on the remaining 85 percent for their necessities. This 85 percent of the population can be identified as those who dwelled in villages, forests, etc.

This view of settlements within an empire of the

Iron Age seems to be instructive on the situation in the Chalcolithic times. This period, with its copper technology, was a bit weak in food production, as heavy iron implements were not available. They made use of river banks and light soils for agriculture which supplemented the natural food supply. Urbanization existed in these cultures, but its percentage need not be higher than that of the Iron Age Cultures. This technological period is classified as Pre-Harappan, Harappan and Post-Harappan. It can be pointed out here that a site might appear to be Chalcolithic on the basis of limited excavations. But there is a possibility of the coexistence of earlier cultures with later cultures, either in parts of the same settlement or on different settlements in a given region. This requires careful consideration.

Large Chalcolithic settlements are few in number as compared to smaller settlements. But the bigger settlements are usually those that are studied and the smaller settlements are usually neglected. The reasons for this lie both in the sociocultural ethos of the workers, as well as in the basic availability of undisturbed sites. The former lays down the fashions and areas for research. As sociocultural conditions change, the old data are reworked, new data are collected and new viewpoints are introduced. Often this change is considered a new parameter in research. Due to the ethos of today more emphasis is given to urban studies and the analysis of smaller settlements is not undertaken on a sufficient scale to permit a glimpse of the ways of life in these places. However, some research undertaken by the Department of Archaeology, M.S. University of Baroda, in Gujarat, throws some light on it. The discovery of Harappan settlements in this state can be traced to the work of M.S. Vats, who in 1927 identified Harappan elements at the site of Rangpur in Limbdi Taluka. After this initial work, Father Heras noted the site of Somnath; however following this there was a lull in the field for about two decades.

Independence gave an impetus to discovering sites of Indus Culture in India and after 1947 many of their settlements were discovered in places such as Jammu, Kashmir, Punjab, Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, and Uttar Pradesh. The excavations at a few sites have enriched our knowledge of the chronology, foreign relations, and the cultural aspects of the urban life of the Indus Culture.

It is a well-known fact that urban life cannot exist without a strong rural base. The study of this base has received much attention. This lacuna is now slowly being filled through the excavations at rural settlements in different parts of Gujarat. These sites were found in exploration by the staff and students of the Department of Archaeology and Ancient History, M.S. University of Baroda as well as the Archaeological Survey of India and the Department of Archaeology, Gujarat State (Fig 14.1).

Rural settlements are usually comparatively small with a modest thickness of deposit. For example the site of Dhatva in South Gujarat has a radius of about 150 meters and Jokha, a nearby site, is not much larger. Sites like Telod and Mehgam are also small. In Central Gujarat, the site of Nar is of modest size, as are the sites of Jafarabad, Vadgam, etc., in the Bhalbaru area. None of them is more than about 100 meters square. The picture from Kutch is identical to that from other parts of Gujarat.

Sites around Lothal and those in Jamnagar District or central Saurashtra also fall in the same class. In North Gujarat, however, the site of Zekda (Pl. 14.1) was spread over an area measuring about 700 by 200 meters. Large parts of the area were, however bereft of any measurable archaeological deposit. These features pointed out that the habitation was scattered.

A perusal of the thickness of the deposits indicates that some of the sites are a mere scatter of material exposed by the farmer's plough. Such areas often have distinct patches of antiquities. These patches are marked by an ashy color and a scatter of ceramics. They suggest the existence of small huts; this based on an analogy of remains from the recent past. The thickness of deposit at these sites ranges between 50 and 150 centimeters.

These sites have two distinctive features: (1) they are really small settlements, and (2) they probably did not survive for a very long period; at least not long enough to permit a large accumulation of archaeological debris. Both these characteristics rule out the possibility of their being urban centers, which are characterized by good planning, a road system, fortifications, brick buildings on raised platforms, systematic drainage, etc. Minor antiquities like seals and amulets are also indicative of urban functions. In the absence of this material content and the presence of ceramics, graffiti, triangular cakes, terracotta *mushtis*, balls, microbeads, and copper objects typical of the Harappan Culture they have been classified

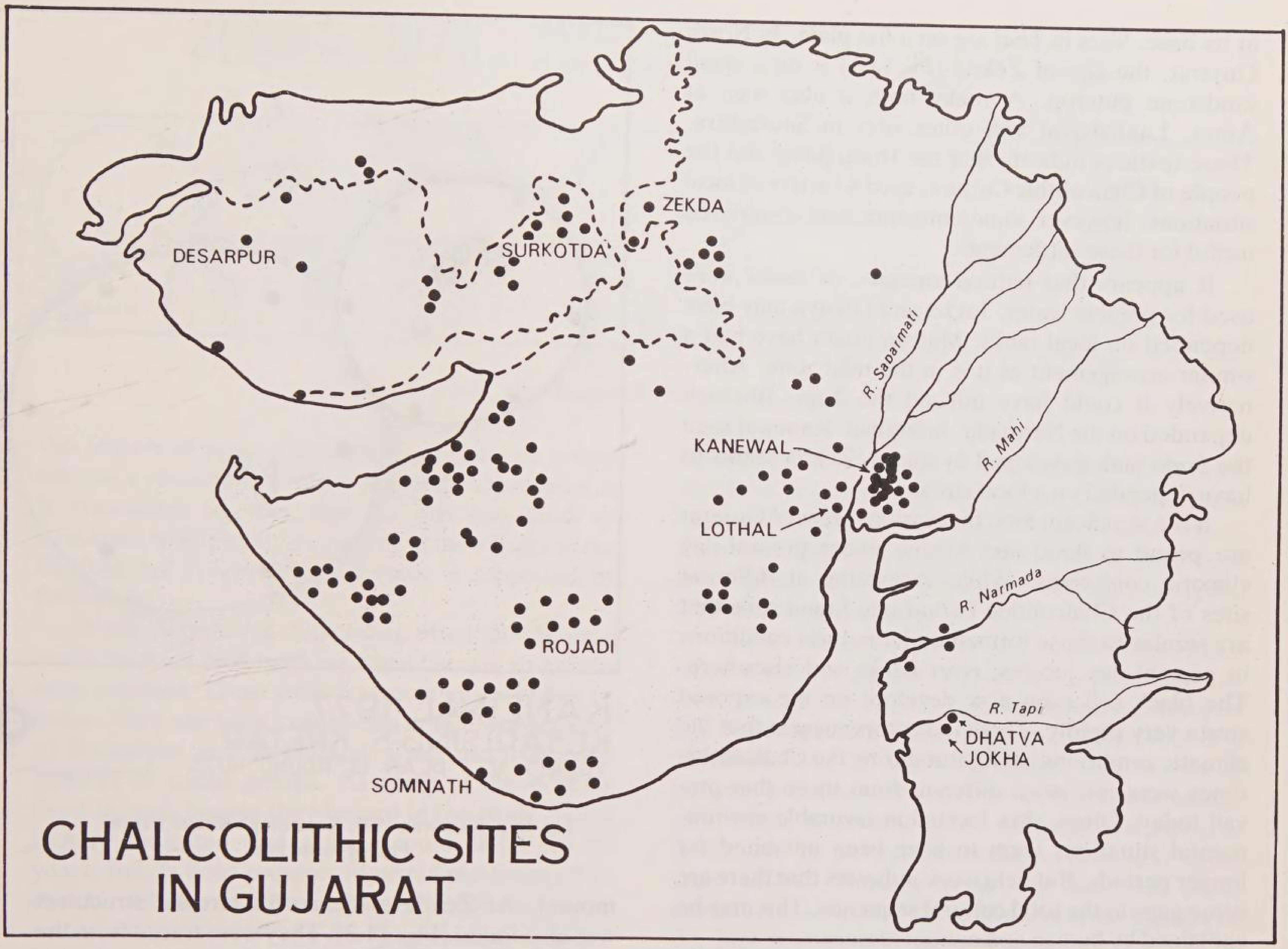

Fig. 14. 1. Chalcolithic sites in Gujarat.

as rural. They also outnumbered the so-called urban centers, and formed the base for their existence. According to the root meaning of "urban" these were "fortified habitations" and by an extension of the notion these places were involved in activities like administration, education, industrial production, trade, and commerce. The small settlements would have been the "service area" supplying basic necessities such as grain, milk and other farm or dairy products as well as forest goods. These materials could have been supplied by farmers, cattle breeders, fishermen, hunters and collectors of food, minerals, and stones. But where and how did these groups live? The answer to this question can be given theoretically: they were the inhabitants of contemporary villages and lived in forests. However, a proper understanding of the past requires exploration and excavation.

The research done on these sites indicates that particular geographical features are associated with these habitations. These include the availability of potable water, a local eminence for relative immunity from monsoon floods, and a convenient vantage point. These settlements are found on a variety of local soils. In South Gujarat, the site of Malvan is on an infertile tract near the River Tapi. The soil on which the habitation began was *kankari,* locally known as *kankaria vago.* The sites of Jokha and Dhatva, located within 50 kilometers of Malvan, are on black cotton soil. The sites at Daheda and Jafarabad in Khira District are on sand dunes. The site of Kanewal (Pl. 14.2) has structures on the dune as well at its base. Sites in *bhal* are on a flat plain. In North Gujarat, the site of Zekda (Pl. 14.1) is on a small sandstone outcrop. A rocky base is also seen at Amra, Lakhabaval and other sites in Saurashtra. These features indicate that the Harappans, and the people of Chalcolithic Culture, used a variety of local situations; however some eminence was considered useful for these settlements.

It appears that natural streams, or tanks were used for potable water. Jokha and Dhatva may have depended on local tanks. Malvan might have had a similar arrangement as it is in the tidal zone. Alternatively it could have utilized the Tapi. Bharuch depended on the Narmada. Jafarabad, Kanewal used the *boda* tank developed by dunes. Zekda seems to have depended on a local stream.

It is a significant fact, that various areas of Gujarat are prone to flood and famine under present-day climatic conditions. While excavating at different sites of the Chalcolithic Period one found soils that are similar to those formed under natural conditions in present-day jungles, river banks and elsewhere. The black soil even now develops on the exposed strata very rapidly. These indicators suggest that the climatic conditions in Gujarat during the Chalcolithic times were not much different from those that prevail today. Often, sites located in favorable environmental situations seem to have been inhabited for longer periods. But field work indicates that there are some gaps in the total cultural sequence. This may be explained by human and natural reasons.

A famine during the 17th century in Gujarat destroyed a large part of the population. As a result many settlements were completely deserted in South Gujarat. Some of these have been recently reoccupied with more favorable climatic conditions. Similar phenomena could explain both the desertion and reoccupation of the sites as well as migrations. They could also explain the gaps in the cultural sequence at different sites.

Excavations have produced some information on the housing pattern of the rural Chalcolithic folk. At Jokha, evidence for mud flooring was available, but the whole house plan was not there. However at Kanewal circular structures were discovered (Fig. 14.2). The evidence at Kesarising's Khetar mound also indicated that the circular structures existed from the beginning of the settlement until its end. At Saino-tekro the circular structures indicated a contemporary situation; but only at a specific point on the mound. At Zekda evidence for circular structures was also found (Fig. 14.3). They were traced from the beginning to the end of the habitation. These circular structures had two plans. One was an uninterrupted circle. The other was a circle with a rectangular porch attached to it.

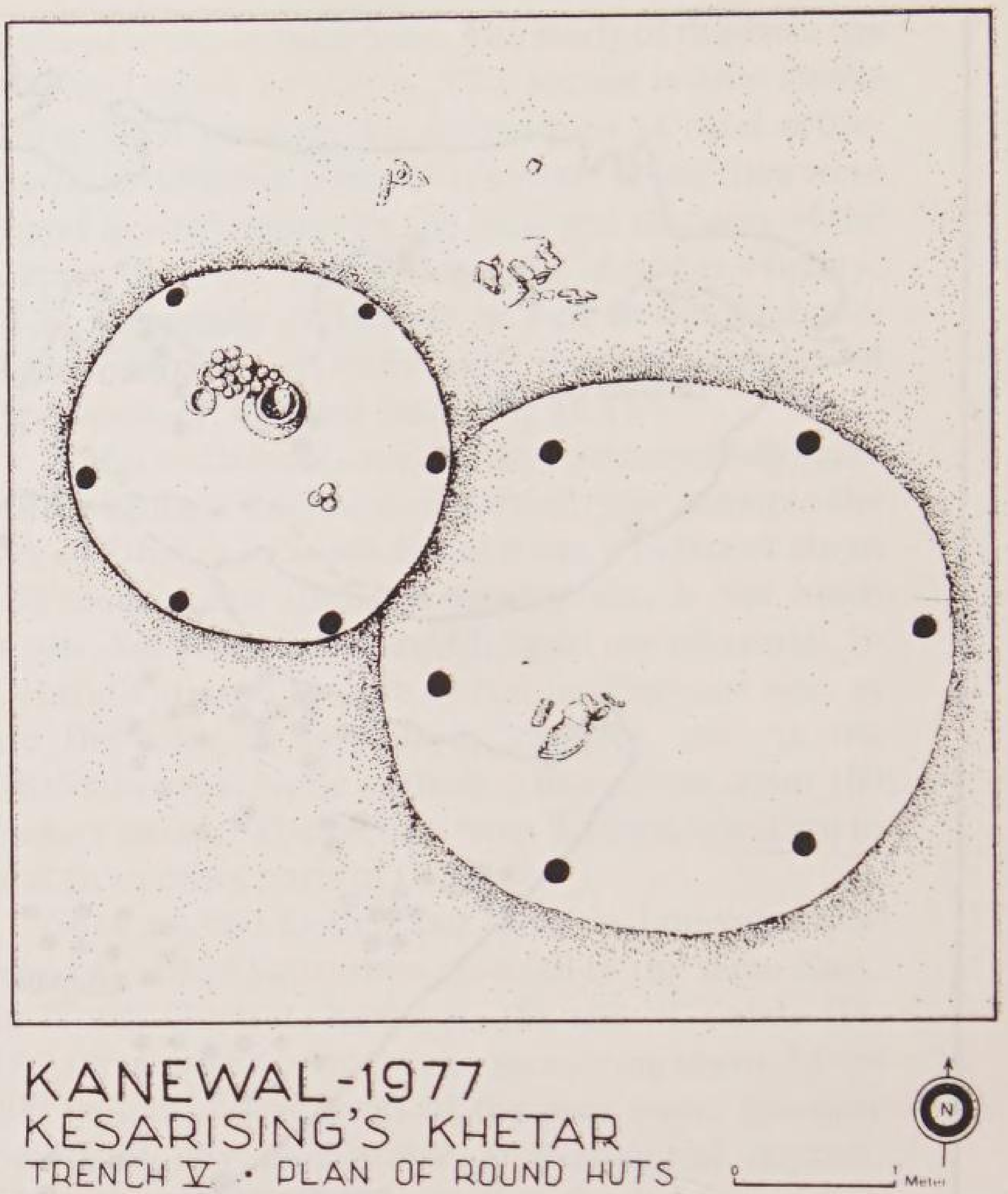

Fig. 14.2. Kanewal, 1977. Kesarising's Khetar trench
Plan of round huts.

These structures had mud walls supported by wooden posts arranged along the circumference of the circle. In at least one case the presence of a central pole was indicated on the plan. At Zekda evidence of a raised water place, called a *paniyara* was available. Evidence for a hearth (*chula*) was also traced. Some burnt wall remnants indicate that they were rather thin and reminiscent of wattle and daub or the type known as *khaparda*, a frame of reeds on which a mud-cowdung mixture is applied.

Three types of structures are usually seen in the country at present. One is the hut (*zupadi parnakuti*) with wattle and daub or *khaparda*. The other is known as a *pidaria* house. It has mud walls. The third house type is of brick which is fairly rare in the rural areas. If

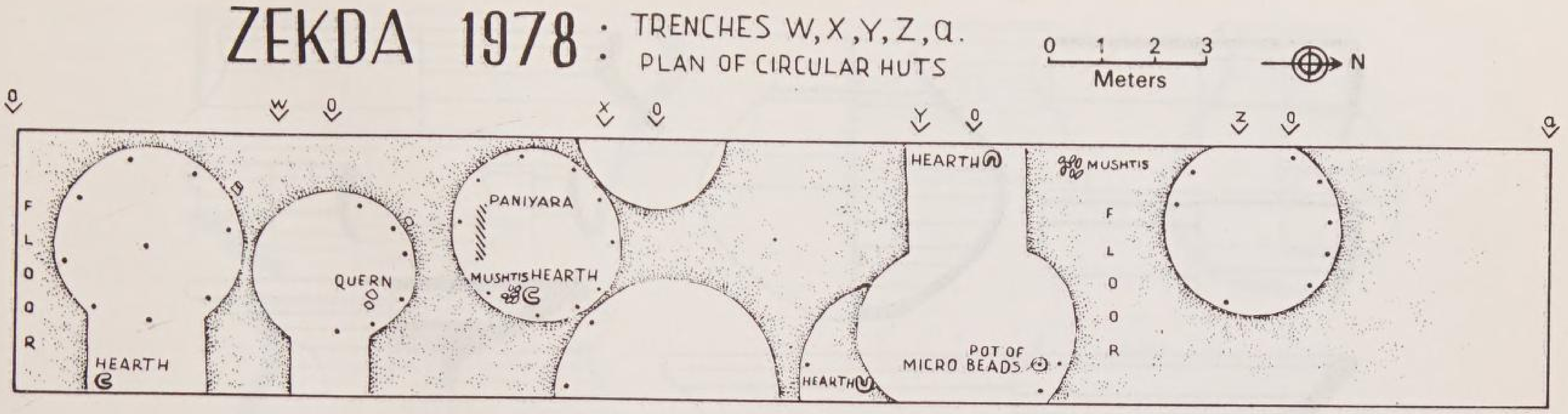

Fig. 14.3. Zekda, 1978. Trenches W, X, Y, Z, A. Plan of circular huts.

this feature of present-day village architecture is considered a phenomenon representing the recent past, it is reasonable to infer that the first two kinds of structures would have been found in the villages of the Chalcolithic Period. This inference is supported by field work.

While excavating, interesting observations were made by local field workers when circular structures were exposed. These circular structures are known as *kuba*. They are seen extensively in the Marwar area of Rajasthan and in Gujarat. They are used by a number of social groups. As some of the workers lived in such houses they helped in the study. Local inquiry indicated that a *kuba* could easily last 50 years, but its floor requires repeated plastering. The thatch roof also requires repairs either every year or every alternate year. As the family expands other *kubas* are constructed in the vicinity. If this tradition of the present-day villages is valid for the past, it could be assumed that a few families occupied different sites in a given area. Villages either grew around these family dwellings, or they were deserted for real or imaginary reasons. This type of movement existed in parts of Gujarat until recently.

The *kuba* is a fire hazard and they are often destroyed by such accidents. Evidence of this was also found at Zekda, Dhatva, Kanewal and other places.

Kubas have a long history so assigning them to a particular chronological horizon has to be done with the minor antiquities found in, or around them. Fortunately at Kanewal and Zekda there were huts with a hearth, typical Harappan ceramics (Figs. 14.4 and 14.5), terracotta balls, dishes-on-stand, microbeads, etc. From the same horizons came triangular cakes, *mushtis*. Harappan pottery includes Red Ware, Buff Ware, as well as ceramics reminiscent of Kot Diji, crude Red Wares, and Incised Wares. Black and Red Wares in crude and refined fabrics were also recovered. Zekda had painted Black and Red Ware, Reserved Slip Ware, etc. Copper, stone beads and stone tools were also discovered. These are all typical Chalcolithic antiquities.

These minor antiquities raise a number of questions of cultural dynamics and affinities. In the Indian situation one has to be a little cautious if one assumes the existence of a cultural group on the basis of a particular type of ceramic industry. The studies of potters, indicate that many of them produce utilitarian wares of several types. Some specialization is noticeable in potters themselves. They also trade their wares. Thus, a variety of ceramics could accumulate on a site. These features seem to point to the fact that several cultural trends, which can be described as old and new, coexisted in these rural settlements.

A reference to the chronological situation over a larger area indicates that at ca. 2000 B.C. Ahar was active, along with Lothal and Mohenjodaro. These sites are all in distinct cultural zones. A question concerning the movement of people therefore becomes relevant. Such movement could bring different cultural groups to a common platform of coexistence. It could cause a recession of one group and the continuation of others in the same area.

Evidence of coexistence is provided by an examination of techniques and materials. The occurrence of a copper knife at the Late Stone Age site of Langhnaj, and the anthropomorphic copper object from Lothal can be cited as evidence for the exchange of materials. The availability of cores with the crested grinding ridge technique from Saurashtra and long fluted cores from Chandaravati can be inter-

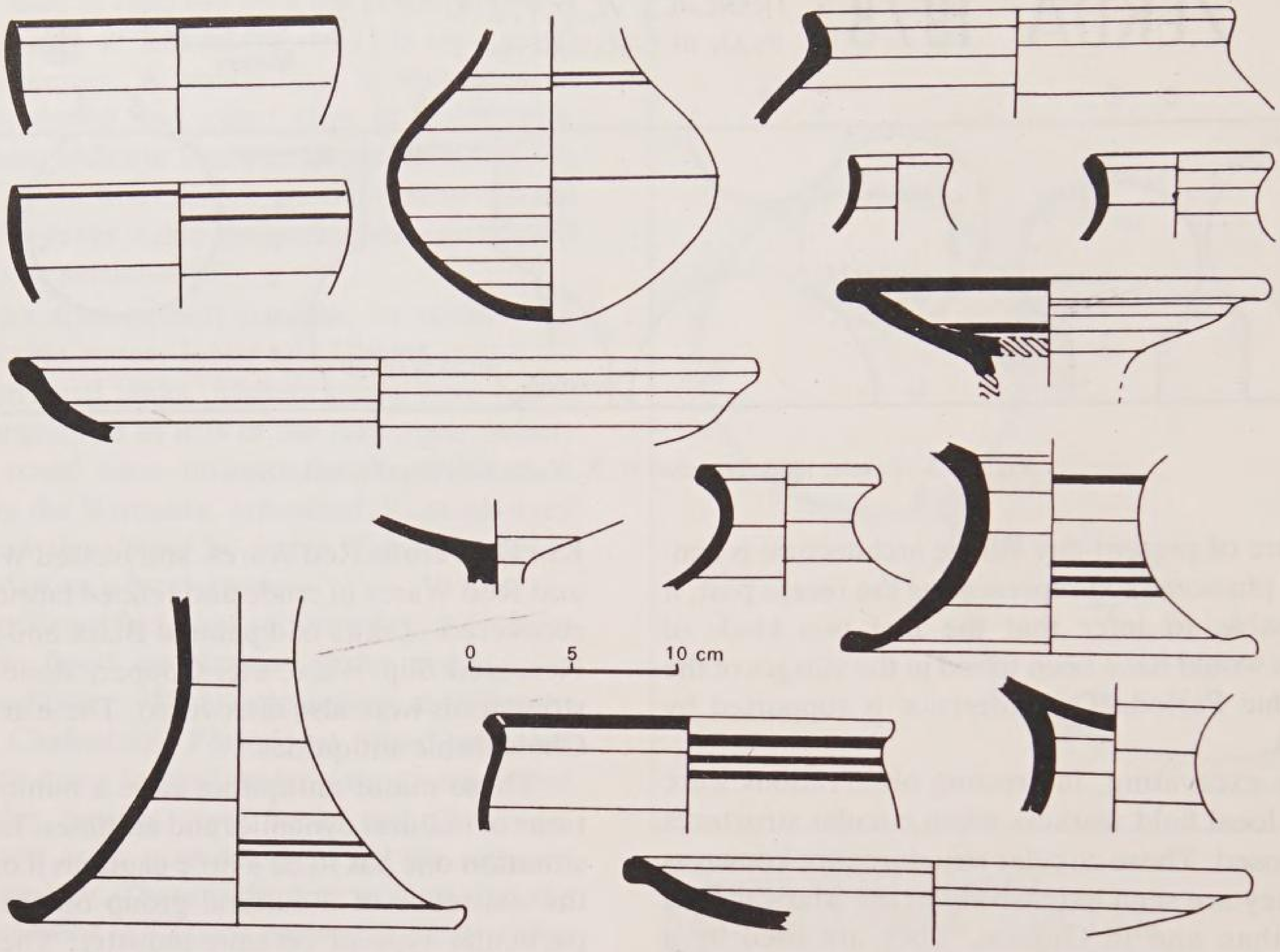

Fig. 14.4. Pottery from Kanewal and Zekda.

preted as evidence for the acceptance of these techniques by the Late Stone Age groups. The production of stone tools, especially short blades and geometric microliths by the villages of Jokha, Dhatva, Kanewal, Zekda, as well as by the urban dwellers at Lothal and Surkotada indicate the acceptance of the Late Stone Age techniques by these Chalcolithic groups. This is partly due to the fact that this technique is suitable for working with the available raw material.

Stratigraphically, there is some interesting evidence for the recession of one group and the continuity of another at Sai-no-tekro at Kanewal. On this sand dune the lower deposit is Late Stone Age material. Two huts of Chalcolithic people were traced over this level. After the destruction of the huts came Late Stone Age tools, cores, flakes, etc. This evidence indicates that after the abandonment of the Chalcolithic villages; the Late Stone Age Cultures continued to exist. The situation reminds one of the historical period.

The historical urban centers like Champaner, Shamlaji, Maheswere, Nagara, Tripuri, and others have clear evidence for the destruction of urban life and the continuation of rural settlement. It is also seen that the cultural groups that received a temporary setback eventually revived their vitality and replaced the later groups. The evacuation of a given area in the time of stress, brought on by either natural or human forces, and its reoccupation is also known. It seems that such a phenomenon is reflected in the evidence from Kanewal.

It would be interesting to analyze the faunal and floral environment of the rural setting. As already discussed, the character of the soils below the Chalcolithic habitations and the present-day earth are similar. The soils developed in forest areas and covering the structures of the 15th-16th centuries are also similar to those that are found below these habitations. If this similarity represents the climatic factors of temperature, humidity, seasonal changes, etc., then it can be concluded that the climate of the Chalcolithic Period was similar to the present. The argument can also be supported by animal remains. These sites have cattle, buffalo, *barasingha, chital,* hog deer, *nilgai,* rhinoceros, pig, dog, varanus, sheep, goat, cheetah and a variety of shells. The

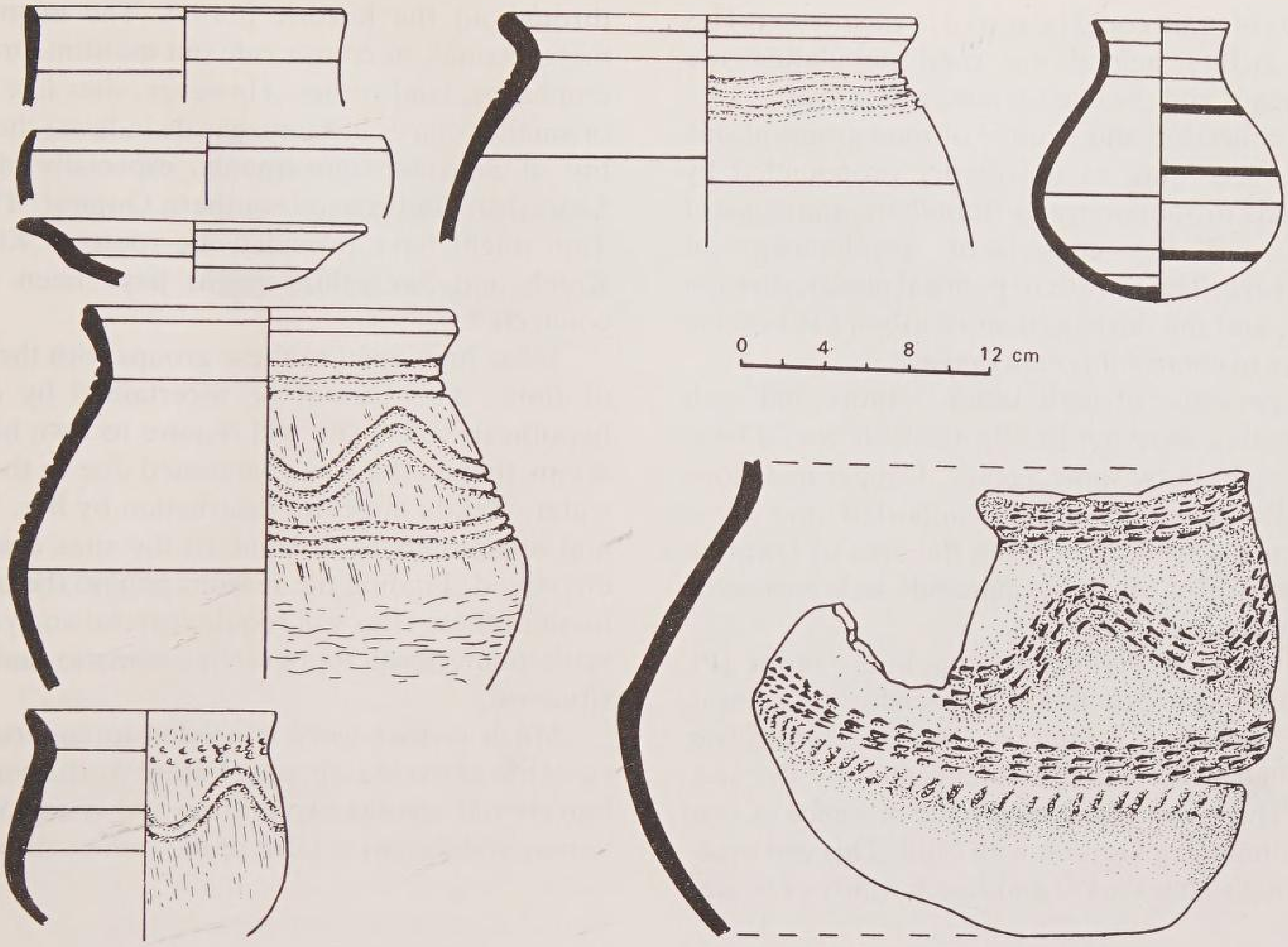

Fig. 14.5. Pottery from Kanewal and Zekda.

presence of all these animals in Gujarat has been established; although some of them are now extinct. But, it is important to note that they were wiped out due to human interference, such as over hunting. They indicate, then, that the environment has been fairly steady for a long period.

The discovery of charred animal bones and those with cut marks give some idea of nonvegetarian eating habits. Domesticated goat, sheep, cattle were eaten as well as deer, *barasingha, nilgai,* and pigs. Varanus was also consumed. Even at present, it is considered a delicacy, especially in winter, by some living tribes. The presence of cheetah indicates the existence of wild cats that subsisted on the animals and were in turn the food of man. Today these carnivorous animals are being continuously destroyed by man. The presence of camel and horse is also indicated. So also is the presence of bullocks indicated, being used for transport.

These animal remains also provide interesting environmental data on the basis of their natural habitats and food habits. Hog deer, *chital,* cattle and buffalo, subsist on grass. The goat and *nilgai* require foliage. The rhinoceros and pigs require marshy areas which develop in natural depressions along streamlets, rivers and between sand dunes. These natural water reservoirs supply drinking water for animals and men, and also produce vegetation like the lecromina croix, as well as wild varieties of edible grains. The lecromina croix was found at Zekda. The presence of rice, wheat and other grains from other sites indicates that along with agriculture, there was the collection of wild grains like *banti sama,* which grow in the areas where lecromina develops.

The environmental picture with foliage, grasslands and marshes is indicative of abundant food resources. Local forests also had an abundant food supply all the year round with fruits, tubers, beans and grains. This broad base of food encouraged the life of *vanprasthas,* who lived in forests, and *unchravritti* of Indian saints. Interestingly, the collection of wild edible seeds can yield a fairly large stock, one which can last for the lean period of the year. Agricultural and cattle breeding activities would further augment this base. The discovery of large storage jars from Kanewal indicate that about 150 kilograms of grain could be stored in each vessel. This storage facility helped the rural population use grains, beans and the like for most of the year.

This collection and storage of food grains at one place is, according to the theory propounded by Bhoja Raja in *Samarangana Sutradhara,* the cause of struggle and the consequent development of *matsyanyaya*. The growth of political power, division of labor, and the development of urban life became necessary to control this *matsyanyaya*.

The presence of lapis lazuli, steatite and such materials that were not locally available would have been brought in by some agency. Copper and stone beads also might have been imported into these settlements. Chank came from the area of Dwarka. The presence of all these materials indicates some system of trade.

Ceramics with graffiti of the Indus script (Pl. 14.3) from these settlements, especially at Kanewal, indicate some form of literacy. These literate village settlers had wide contacts as indicated by the antiquities. These contacts indicate the presence of land routes connecting Gujarat with Sind. This was probably through Thar Parkar and Kutch which were used throughout the historic period. The inland settlements would, of course rule out maritime trade, and emphasize land routes. However, sites like Malvan, or smaller places in Jamnagar do indicate the possibility of maritime movements, especially in eastern Saurașhtra and coastal southern Gujarat. The River Tapi might have provided the route to Khandesh. Kutch and Saurashtra might have been similarly connected.

What happened to these groups with the passage of time? This cannot be ascertained by a simple hypothesis. Each site will require its own history. It seems that Jokha was abandoned due to the lack of water. Zekda indicates destruction by fire. Drought and abandonment of some of the sites can also be envisaged. Finding the reasons behind the abandonment of these sites will require careful analysis of the settlement, local topography, climatic and human situation.

Much further work is needed to understand the rural life of the Harappans. Future work on this problem should involve exploration and systematic excavation in different regions of the Indus Culture.

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S.A. SALI

15. The Harappans of Daimabad

INTRODUCTION

My discovery of some 50 Late Harappan settlements in the Central Tapti Basin, Dhule District of Maharashtra, proved that the Harappans penetrated the Deccan (Sali 1970, in press). Although the details of the Harappan occupation of the Tapti Valley could not be understood for want of horizontal excavation at a suitable site, the evidence obtained through surface explorations indicated an absence of the urban discipline characteristic of the Mature Harappan. It also suggested that the Harappans who came from Gujarat and settled in this region had lost their prosperity before they reached the northern Deccan. The most important aspect of this discovery, however, was that it made a vast region of the Deccan available for the study of the degenerated phase of the Harappan Culture. It also made it possible to investigate Late Harappan impact on the local, succeeding Chalcolithic Cultures of the region. Research at Daimabad in the upper Godavari Basin has made a beginning toward these ends. This paper will present the evidence for the Late Harappan Phase obtained from the excavation of this site.

THE SITE AND ITS ENVIRONMENT (Fig. 15.1)

Daimabad (lat. 19°31′ north; long. 74°42′ east) is now located in a deserted village. The modern community was recently amalgamated with the village of Ladgaon in Shrirampur Taluka of Ahmednagar District, Maharashtra. The site is located on the left bank of the Pravara River, a tributary of the Godavari, 18 kilometers southeast of Shrirampur and six kilometers southeast of Padhegaon. Both these settlements are stations on the Daund-Manmad section of the Central Railway. The occupation deposit varies in thickness from place to place. The maximum of five meters of deposit was exposed in Sector I. Occupational material was always found to overlie black cotton soil which developed on the yellow *kankari* silt. This represents the topmost deposit of a 10-meter high alluvial flat developed in a concave loop of the River Pravara during the Late Pleistocene Period. The terrain surrounding the site is a series of Late Pleistocene alluvial flats, one to two kilometers wide, which imperceptibly merge into valley pediments developed on basaltic rocks of Cretaceous-Eocene age. Drainage density is low and most of the local tributaries are monsoon ephimerals. Medium loamy and pedocalic black soils are predominant. The vegetation is the thorny scrub forest characteristic of the semiarid belt.

PREVIOUS WORK

The site was discovered in 1958 by Shri B.P. Bopardikar (IAR 1958–59: 15). Excavation in 1958–59 by Shri M.N. Deshpande revealed evidence for three phases (IAR 1958–59: 15–18). Painted pottery was scarce in Phase I. The main ceramic was a thick coarse Gray Ware, similar to that from Brahmagiri I. Vessel forms included the large globular urn with a flared rim, a basin with a slightly turned-out rim, a spherical bowl and stemmed lid with a pointed or rounded tip. The rim and the tip of the lid was painted with red ochre color. Another associated ware was handmade with incised and applied decorations. A single grave, partly cut by a later pit, but containing

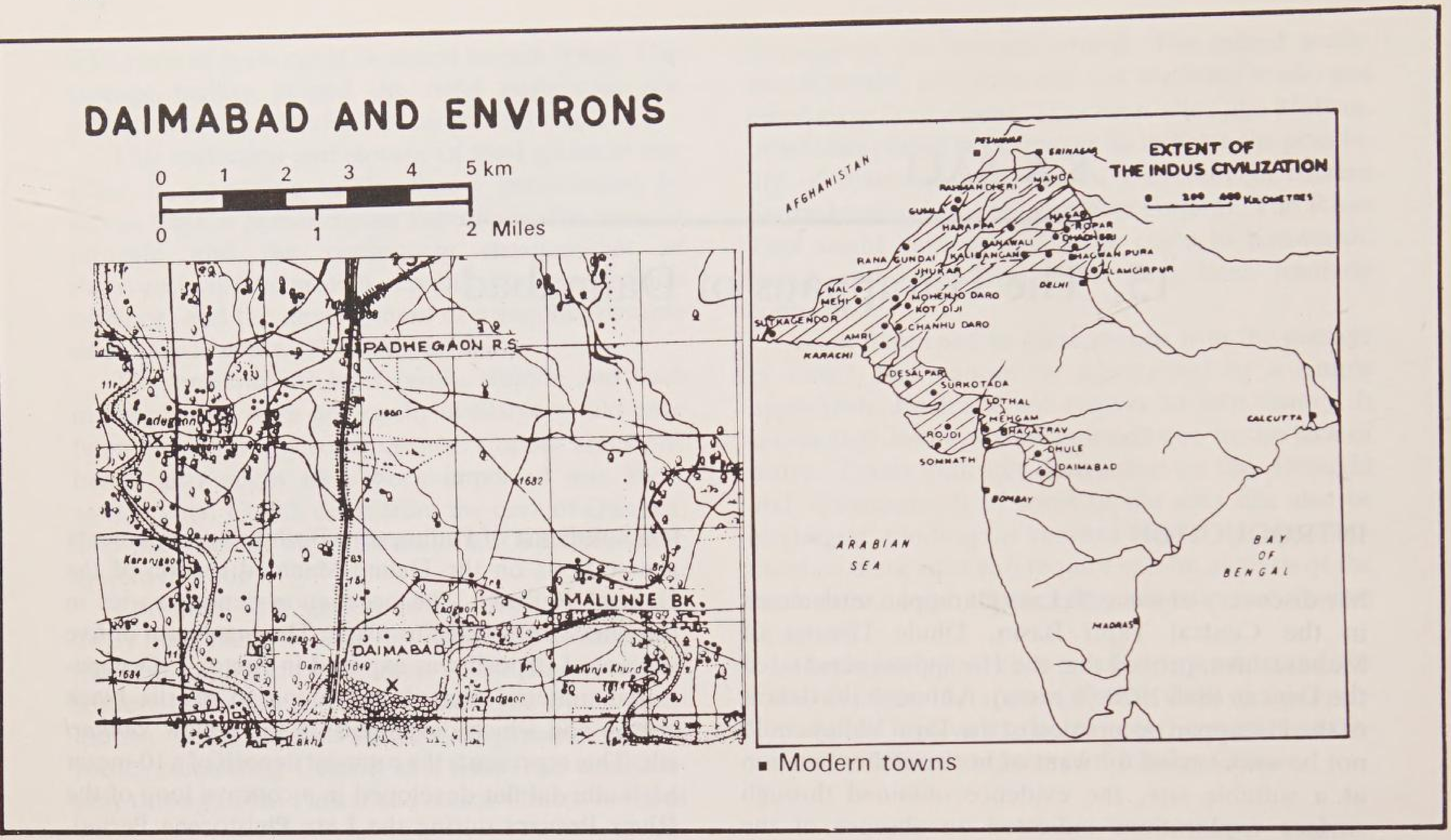
DAIMABAD AND ENVIRONS
0 1 2 3 4 5 km
0 1 2 Miles
PADHEGAON R.S.
Padegaon
Karanjgaon
MALUNJE BK.
DAIMABAD
Malunje Khurd
1682
1684
EXTENT OF THE INDUS CIVILIZATION
0 200 400 KILOMETRES
AFGHANISTAN
PESHAWAR
SRINAGAR
MANDA
RAHMAN DHERI
GUMLA
HARAPPA
HASAR
ROPAR
CHACHERI
BANAWALI
BHAGWAN PURA
RANA GUNDAI
KALIBANGAN
JHUKAR
ALAMGIRPUR
DELHI
NAL
MEHI
MOHENJO DARO
KOT DIJI
SUTKAGENDOR
CHANHU DARO
AMRI
KARACHI
DESALPAR
SURKOTADA
LOTHAL
MEHGAM
BHAGATRAV
ROJDI
DHULE
DAIMABAD
SOMNATH
BOMBAY
CALCUTTA
ARABIAN SEA
BAY OF BENGAL
MADRAS
■ Modern towns

Fig. 15.1. Daimabad and environs.

one skeleton, was found. Chalcedony blades, terracotta beads and semiprecious stones were also found in this, the first occupation.

Phase II was represented by the well-defined Malwa Ware. Of medium fabric, this ceramic was treated with a thin slip which fired brown, deep red, light orange or pink. Vessels were painted in black with geometric designs such as hatched triangles, squares and lozenges, hooks, loops, festoons, etc. The types included in this ware were the subspherical bowl, sometimes with a tubular spout, shallow cup, short-necked *handi,* high-necked jar, and vase with a channel spout. A burial in a specially dug pit with a complete skeleton oriented north-south and without any associated furniture, was found in the levels of this phase. The other finds included a fragmentary celt, a pinhead and a broken knife all of copper, the head of a dog and also a humped bull in terracotta, and beads of semiprecious stone, shell and faience.

Phase III was a Jorwe occupation. Jorwe Ware had a fine fabric, was turned on a fast wheel and was well fired. The main types included the concave-sided carinated bowl, occasionally with a tubular spout, a *handi*-type vase with a flaring mouth and tubular spout, and a vase with a globular body, high neck and beaded rim. The painted designs in black were linear and geometric, although animal motifs were also present. The Burnished Gray Ware and the handmade thick coarse ware of Phase I persisted into this phase. Microlithics, stone maceheads, pottery spindle-whorls, beads of semiprecious stones, a gold coil, two terracotta human figures and a terracotta dog were also found.

Two types of burial practices were in vogue during Phase III: the extended inhumation and the urn burial. One of the two interred skeletons was completely despoiled. The second, oriented north-south, rested on a rammed clay floor in the habitation area. It had no grave goods and it was damaged below the knees. The body had not been placed in a pit; but around it were 14 postholes, suggesting the existence of a canopy over the interment. This is, therefore, probably a case of lying in state prior to burial. In the urn burials the urns are a Burnished Gray Ware with a globular body and flared mouth. These were placed mouth-to-mouth, with a north-south orientation, in a pit just sufficiently large to accommodate them. The skull, ribs and lower extremities were placed in the vessel. A single urn burial, with the pot's mouth facing south, was also found. Three urns were placed horizontally for the burial of a mature child. A carinated bowl and a spouted *handi*-type vase were subsidiary vessels.

In 1974 there was the chance discovery of a cache of four solid bronze figures at the site.* This group included a chariot yoked to a pair of bulls driven by a human, an elephant, a rhinoceros and a buffalo. This find necessitated further excavation at the site. In 1974–75, S.R. Rao (1978) renewed the excavation of the site. His main objectives were to reassess the cultural sequence, and determine whether there were cultural contacts with Harappan or Late Harappan settlements. He divided the occupational deposit into three periods, I, II and III.

Period I (1900–1700 B.C.) was divisible into two Subperiods, A and B. Subperiod IA was the first Neolithic settlement and had plain, handmade gray pottery. Subperiod IB was characterized by pottery made on a slow wheel, painted in red on a grayish or red surface. The three main ceramics of Subperiod IB were the Gray Slipped Ware, a dark Gray Burnished Ware and dull Red Ware. A few vessels were turned on a fast wheel. The painted designs included vertical wavy lines drawn in groups, cross-hatched bands and ladders, and an antelope. These designs suggested, according to Rao, contact with the Late Harappans who had by now moved to the Tapti and Godavari Valleys.

Period II (1700–1500 B.C.) was characterized by Malwa Ware and the Cream Slipped Ware. Rao thought that designs such as the hatched diamonds and dancing figures on Malwa Ware were influenced to a large extent by the Late Harappan. During the Period III (1500–1000 B.C.) Malwa Ware decreased and Jorwe Ware increased. The main types Rao found in the Jorwe Ware were stemmed bowls of Rangpur IIC type, concave-convex bowls, spouted vessels and globular jars.

Rao claimed to have identified furnaces used for refining copper. He also thought he had found evidence for the survival of the Indus Script in Periods II and III. The evidence he used for the presence of a simplified script at Daimabad, is the occurrence of Indus symbols on pottery. Most of these signs are identical to the cursive alphabet found during the Late Harappan Phase in Gujarat and the Indus Valley.

EXCAVATIONS AT DAIMABAD 1975–76 to 1978–79

I have excavated at Daimabad for four seasons (1975–76 to 1978–79) and have obtained evidence for a succession of five Chalcolithic Cultures. Each of these is characterized by a distinct class of painted pottery:

Phase I	Savalda Culture
Phase II	Late Harappan Culture
Phase III	Buff and Cream Ware Culture
Phase IV	Malwa Culture
Phase V	Jorwe Culture

People of the Savalda Culture built the first, and smallest, settlement at Daimabad. They occupied a three-hectare strip of black cotton soil near the bank of the Pravara. The largest settlement of 30 hectares was occupied by the last of the Jorwe inhabitants. The other three settlements, including that of the Late Harappans, covered not less than 20 hectares. Ancient Daimabad is thus the largest Chalcolithic site to have been found in Maharashtra. The salient features of each phase are summarized as follows:

Phase I

The Savalda Culture is characterized by Savalda Ware. Of medium to coarse fabric, the ware was made on a slow wheel and has a thick slip with a crackled surface. The color is light brown, chocolate, red and pink. It is chiefly painted in ochre red with occasionally black and white pigments. The designs included arrows, antenae-ended pointed and rounded arrowheads, a harpoon, sword-like designs, plant, deer and fish motifs as well as linear designs such as horizontal bands, radiating lines, groups of short strokes, pointed strokes, wavy lines and oblique strokes. There are very few types: a vase with an out-curved rim and squat globular body, a *handi*-type vase and a vase with a short splayed-out rim. The Burnished Gray Ware, the Black Burnished Corrugated Ware and the handmade Thick Coarse Red Ware with incised and applied decorations are the other ceramics of Phase I.

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*Editor's note: See M. K. Dhavalikar's paper in this volume for further discussion of this hoard.

The mud-walled Savalda houses were at times rounded on one end. Structures of one, two and three rooms were found. The smallest house, with a single room, measured 3.4 by 1.6 meters. The largest house was seven by five meters. The floors, which were occasionally decorated with fresh water shells, were made of alternating layers of yellow silt and black soil.

Barley was cultivated along with lentil, the common pea, grass pea, black gram, green gram, horse gram and hyacinth bean. They also had copper/bronze rings, beads of carnelian and agate, microliths, tanged bone arrowheads and stone mullers and querns.

Phase II will be described later since it is the main subject matter of this paper.

Phase III

The Buff and Cream Ware which characterized Phase III was generally made on a slow wheel. Only an occasional fast wheel example was met with. Of medium fabric, the clay contained vegetable temper. This was indicated in the core by the presence of air holes. The core also had a band of gray or ivory color suggesting that the ware was underfired. It was treated on the outside with a thin slip which flaked off in places. The painting was generally black with geometric designs such as cross-hatched elongated triangles, diamonds and squares, horizontal bands, groups of wavy lines, comb-like design, circles and animal motifs with stippled bodies.

Fragments of two graduated terracotta rings suggested that the people of this phase had their own measuring system.

They practised symbolic as well as partial burial.

Phase IV

Phase IV was represented by Malwa Ware. Extensive evidence has now come to light at Daimabad to show that the Jorwe Culture was mainly derived from the Malwa. For example, types such as the carinated bowl, the *handi*-type vase with tubular spout, the incurved bowl and the *lota*, which occurred in Malwa Ware, continued to occur in Jorwe Ware. The same is the case with regard to the so-called black painted potter's marks and the graffiti. Similarly, the double-urn burials, so characteristic of the Jorwe Culture of the Upper Godavari Valley, first occurred in the Malwa context. In a double-urn burial of Phase IV one of the Malwa Ware urns was painted with sun, dog and peacock designs. The dog was a favorite animal motif, frequently found on Malwa Ware. One of the examples has a pair of dogs in united position. Another noteworthy scene on one of the potsherds of Malwa Ware is of a man standing in a river with fish and vegetation around him.

Among the structures exposed in the Malwa levels the most interesting is a large mud platform with a channel ending in a soak pit cut into it. This was meant to be used for ablution purposes. There are six types of sacrificial altars including an apsidal, mud-walled structure, called a sacrificial temple. Another altar was made from a series of mud rings. There was also a heart-shaped altar, an oval-shaped altar with a sunken floor, an oval-shaped altar with rounded sides and a rectangular altar. In addition, there were residential rooms closely connected with the religious complex.

The floors of the Malwa houses were decorated with potsherds, by either embedding them on edge or flat. Each house had a low mud step at the entrance, one of which was semicircular, recalling the *chandrashila*.

Phase V

The Jorwe Ware of Phase V at Daimabad comes with all of its characteristic types and painted designs. In addition, there is the Burnished Gray Ware and the handmade thick coarse ware. The Jorwe types from the earliest Phase V levels are deep red in color and have a shiny surface, likened by some to Lustrous Red Ware. But this is the natural outcome of the transition from Malwa to Jorwe. There is neither the true Lustrous Red Ware, nor stemmed bowls of Rangpur IIC type, in this, or any other, phase of Daimabad.

The so-called painted potter's marks on the Jorwe Ware occur only singly here, and many of them are not represented in the list of Indus signs. These marks may have some social or religious significance; but they do not seem to represent a simplified version of the Indus Script.

Structural levels one to five were exposed in this Phase. The houses of structural level four were circular huts with a road and a lane. In the other levels of Phase V they were either rectangular or square. The important features of structural level one included two potter's kilns, one aspsidal sacrificial temple, one crescentic mud structure (perhaps a sacrificial altar), one circular ashpit connected with rituals relating children, and mud-walled houses. One interesting house exposed in Sector I was seven meters long and 3.5 meters broad. The largest of the houses was found in structural level two (House No. 38). It originally measured nine by five meters, and had five major floor levels. With each successive level the size of the house shrank. One of the fully exposed potter's kilns measured five meters square. It was made up of a platform, an outer mud-wall (1.4 meters high and 50 centimeters broad at the base tapering upward to 15 centimeters), the central ash packing which served as insulation, and the thin inner wall of burnt laminar clay. The kiln was filled with fine gravel used to raise the temperature in the kiln. It had two stoke holes. There were two compartments and on the floor of one were found 15 crushed pots. All save one, which was of handmade ware, were Jorwe Ware. The various painted graffiti on the Jorwe pots from the kiln suggest that they cannot be considered potter's marks, as has been generally held. A huge jar of handmade ware found close to the kiln was profusely decorated in applique with arch designs, human and bull figures as well as reptiles.

Among the important finds from the Jorwe Phase is a unique terracotta covered by a coat of red ochre with the figure of a deified sage and his three consorts united with him. There is also a terracotta cylinder seal with a scene of a procession moving through the jungle. There is a horse drawing a cart, followed by a deer looking majestically to the rear. In front is an animal, perhaps a camel, with a long neck.

CHRONOLOGY

Two lists of Daimabad ^{14}C dates have been received from the Physical Research Laboratory (D.P. Agrawal, personal communication). They are given below as calculated from the 5570 half-life as well as the 5730 value (in parentheses). The dates Before Christ are given as well.

The date of ca. 1400 B.C. for the end of the Malwa and the beginning of the Jorwe (samples PRL 411 and PRL 412) appears to be consistent with the ^{14}C determination of 1400 B.C. obtained from Inamgaon for the beginning of the Jorwe Culture there (Dhavalikar 1977: 46–47).

The sample PRL 420 was collected from a slope. It was buried by a patch of sand and silt deposited in a raingully and so it was suspected to have been contaminated. Hence the date of A.D. 500 is not surprising.

Phase	*Sample number*	*Date*
Overlap between Phases IV and V	PRL 411	3230 ± 100 (3320 ± 100) 1370 B.C.
Topmost layer of Phase IV	PRL 412	3250 ± 110 (3340 ± 120) 1390 B.C.
Phase III	PRL 419	2980 ± 110 (3070 ± 110) 1120 B.C.
Phase II	PRL 420	1410 ± 140 (1450 ± 140) 500 A.D.
Phase II	PRL 426	3600 ± 150 (3710 ± 150) 1760 B.C.
Phase III	PRL 428	3400 ± 110 (3500 ± 110) 1550 B.C.
Phase I	PRL 429	3390 ± 150 (3490 ± 160) 1540 B.C.

The date of 1760 B.C. derived from sample PRL 426 is close to what was expected (1800 B.C.) for the upper levels of the Late Harappan Phase at Daimabad. This estimate is based on stratigraphy as well as the date of 1600 B.C. for the beginning of the Malwa Phase in Maharashtra which is based on ^{14}C dates for Inamgaon (Dhavalikar 1977) and the date of 1390 B.C. (or 1400 B.C.) for the topmost layer of the Malwa Phase given by the sample PRL 412 from Daimabad.

The dates from samples PRL 419, PRL 428 and PRL 429 are inconsistent.

PHASE II—THE HARAPPANS OF DAIMABAD

As noted above, Phase II at Daimabad represents a Late Harappan occupation. The deposit of this Phase varies in thickness from a few centimeters at and near the findspot of the bronzes in Sector II to 45 centimeters in Sector IV. In Sector I it was 30 centimeters and in Sector II 20 centimeters. In all sectors the soil color was light brown. Laboratory studies by J.N. Rajaguru (personal communication) show that the Late Harappan occupational deposit at Daimabad underwent weathering, suggesting that the site was unoccupied, although for a short period, after it was deserted by the Harappans and before it was occupied by the people of the Buff and Cream Ware Culture. This occupational deposit was also eroded (Sali in press).

Phase II has the characteristic fine sturdy Late Harappan Red Ware (Pl. 15.1). It is made of fine clay mixed with fine sand and the powder of lime and/or shell was used as a tempering material. The ware was turned on a fast wheel as indicated by the uniformity of the parallel striation marks on the inside. The core of the ware is fairly dense and uniformly light red or brick red in color suggesting that the pottery was baked under controlled, uniform heat under oxidizing conditions. The outside of the ware was treated with a thin slip which is usually red, but occasionally chocolate or light brown, pink and light gray. The black painted designs include horizontal bands on the rim, neck, shoulder and body, crosshatched triangles, groups of vertical wavy and straight lines between horizontal bands, a chain pattern, a buchranian or doublehorn motif, a plant-like motif, interlaced loops painted on the inside of the rim of dish-on-stand, loops, spirals, rows of dots above and below a horizontal band and radiating lines. An interesting design was found on the body of a globular pot lacking only the neck and rim. There were three black bands painted around the body of this vessel. Above the topmost of these bands were two vertical lines painted in black, the upper parts of which had been curved to resemble a snake. Other types (vessel forms) included in this ware are the dish-on-stand, bowl-on-stand, a dish with an internally collared rim, a vase with a beaded rim, a vase with a clubbed rim, a cup or bowl, a vase with a flat base and a vase with a beaked rim.

The associated wares are Ribbed Bichrome, Fine Deep Red, Black and Pale Gray, Burnished Gray Ware and Thick Coarse Ware.

The Ribbed Bichrome Ware (Pl. 15.2) is represented by only a few sherds. It was made from a special paste, very dense in texture and without any tempering material. The core is grayish in color. The slip on one side of the rib was bright chocolate in color, and on the other side it was cream colored. The surface of the latter was painted in black with a loop design. About six sherds were found of the Deep Red Ware (Pl. 15.2). This ware is comparable to that of the Ribbed Bichrome Ware in fabric.

A small number of sherds of the Black and Pale Gray Ware were found. Of fine fabric, the ware is thin and treated internally and externally with a slip which has turned pale gray on the outside and black on the inside. Only one type is represented in this ware: a conical bowl with a carinated neck and featureless rim.

The Burnished Gray Ware is of medium fabric. It was treated with a slip and burnished. The surface colors include gray, ivory, black, pink, brown and their shades. The types met with in this ware are a vase with a flaring rim, a vase with an outcurved rim, a bowl with an almost vertical profile, an incurved bowl, a carinated vase and a dish with a carination below a thin rim. A variety of lids were also found. The rim edge of lids and some of the vases were painted with a horizontal band in red ochre.

The Thick Coarse Ware was handmade with a coarse gritty fabric, pink and light red in color. The ware is decorated on the outside with incised and applied fingertip designs. Those included in this ware are a jar with an outcurved rim, a deep platter or bowl with an almost vertical and thickened rim decorated on the top with fingertip designs and platter with almost vertical sides and a flat rim tip. Embedded in the floor of House Number 17 we found the lower half of a Thick Coarse Ware jar which has a flattish base.

The Late Harappan occupants of Daimabad built both mud-brick and simpler mud-walled structures. Mud bricks were used in two ways: for walls and for a grave. Mud bricks in walls were only attested in fragmentary examples. The size of one of the specimen bricks measured 30 centimeters long by eight centimeters thick. Two other fragmentary bricks were found bonded together with a mortar of black clay. These and other brick fragments were found in a mass which appears to represent the debris from a fallen mud brick wall.

The grave lined with mud brick had an extended human skeleton. This was found in the occupational deposit of Sector I (Pl. 15.3). The ovoid pit bottom of the grave was made in two stages. In the first stage mud brickbats, occasional pebbles and clayey earth were rammed. A layer of clayey earth mixed with fine gravel and burnt clay lumps was spread and rammed over this surface. The floor was then plastered. Full-sized mud bricks and mud brickbats were then placed leaving sufficient space for the corpse to rest on the plastered floor in an extended position. The head is towards the north but tilted to its left The body was covered with a material like hemp, the fibers of which were found sticking to the skeleton. The grave was then covered with earth mixed with a number of brickbats. This formed tumulus with a stone placed at the point where the head was resting. The sizes of the full mud bricks used in the grave were: (1) 32 cm by 16 cm by 8 cm, and (2) 28 cm by 14 cm by 7 cm. Both sizes have the ratio 1:2:4. Complete mud bricks were found only around the head, since the rest of the grave pit was disturbed by later pits.

The evidence for mud-walled houses in Sector II is fragmentary because most of the walls were disturbed by later occupants. The walls that we found were made of black earth with foundations in the black soil which lay below the light brown occupational deposit of this Phase. The shortest exposed wall measured 45 centimeters long and 43 centimeters broad. The longest wall, lying north-south, was traced to a length of 33 meters, its thickness varying from 30 to 50 centimeters. By using the surviving walls we traced patches of floor in six structures (House Nos. 16 to 21), although the complete plan of a house could not be found. Large patches of finely plastered floors were found in Houses 16, 17, 18 and 20. A circular hearth, 50 centimeters in diameter and 10 centimeters deep, containing ash and charred animal bone fragments was found in House 16. On the floor of this same house was a terracotta button-shaped seal bearing an Indus sign (Pl. 15.4). In adjoining House 17 we found another terracotta button-shaped seal with two Indus signs. The lower half of a vase of Thick Coarse Ware with a flattish base was also found embedded in the floor of this house.

The most important finds which set to rest the Harappan character of Phase II at Daimabad are the two terracotta button-shaped seals and three potsherds, all bearing Indus signs or script. The Indus signs on two of the potsherds were engraved (Pl. 15.5) and on one of the potsherds they were painted in black (Pl. 15.6).

Special mention should also be made of a crescent-shaped Red Ware sherd (Pl. 15.7), which had been ground to its present form. On one side was engraved a scene of a tiger attacking a buffalo from behind. The forceful attack of the tiger and the panic of the buffalo have been excellently depicted. On the other side of this sherd (Pl. 15.7) is a horizontal row of six lozenges with oblique lines inside the upper half of each shape and an open space between the two lower lozenges. The unique engraving on this purposefully-shaped potsherd leads one to surmise that the object represents a cult object. Equally important are the finds of a wornout oval-shaped terracotta cake (Pl. 15.8, no. 7), heart-shaped potsherd (Pl. 15.8, no. 12), the shape being artificial, a "carrot"-type clay cone recovered from House No. 20, a fragmentary terracotta scale with a division of 11 millimeters marked by two incised lines, a circular potsherd with a deeply engraved cross mark on both the sides (Pl. 15.8, no. 10), a fragment of a copper/bronze celt and a bead of gold leaf. We also found pottery objects of indeterminate use, blades of chert and chalcedony, carnelian beads, and others of agate and shell, a shell bangle and a large number of bivalve fresh-water shells.

The author has described (Sali in press) the four bronzes, which on circumstantial and stylistic evidence, can be ascribed to the Late Harappan Phase at Daimabad.

DISCUSSION

The pottery types, the Indus script on terracotta seals and pottery, the mud bricks in the 1:2:4 ratio, the grave pattern, the terracotta cake and the "carrot"-type cone are all undoubtedly Harappan cultural traits. The pottery is an inferior quality if compared to that of the Mature Harappan Phase in Gujarat, Rajasthan and the Indus Valley as well as the Late Harappan pottery in the Tapti Valley. This may be due to the quality of local material. But, the most important aspect of the ceramics is that the Harappan potter produced as fine and sturdy a ware as he could and made traditional Harappan types on the fast wheel to keep up his tradition. He, or she, had not given up the production of Bichrome Ware made from a fine paste. The predominant designs were simple geometric patterns painted in black, as was the practice in the Tapti Valley. There is, however, a single example of the snake pattern as found at Lothal (Rao 1963: Pl. XLVIII, 5). This indicates a continuity of both the ceramic tradition as well as that involving the meaning of particular representations.

The Indus script, on both seals and pottery, has the same form as that which occurs during the Mature Phase elsewhere; although the seal type differs in both material and detail. At Daimabad the seals are of terracotta instead of steatite and the knobs on the back are conical rather than dome-shaped. There is also no hole. The absence of steatite in the region must have been the reason for preparing terracotta seals. The absence of animal representations on these seals is also a noteworthy feature. The idea of preparing seals did, however, survive. It is generally held that the Harappan seals were used for commercial purposes. Trade at Daimabad is, however, very unclear.

As noted above, the mass of mud bricks found by the side of a mud wall in Sector II probably represents fallen debris. Thus the Harappans used mud bricks for construction in the early stage of their arrival at the site. The grave lined in mud brick, with its filling forming a tumulus above surface level, has a parallel at Harappa (Wheeler 1947: 89 and Pl. XXXVII B). A grave lined with mud brick was also found at Lothal (Rao 1973: 147 and Pl. XXXVIII B).

Although a complete plan of a Harappan house has not yet been recovered, the exposed mud walls and their traces, certainly indicate a systematic layout for the community. The Harappans of Daimabad had a system of linear measurements, as attested by the fragment of a terracotta scale. How this fits with other Harappan units of measurement has not yet been studied. The "carrot"-type clay cone recalls other clay cones from Mohenjodaro (Marshall 1931: 475–78, Pl. CXXXIV).

The terracotta cake from Daimabad recalls those from Kalibangan, Lothal and other Harappan sites. Its worn condition need not make it a skin scrubber. Whether the artificially shaped triangular, or heart-shaped, potsherd was meant to be used in place of a triangular terracotta cake is not yet understood; although such a possibility cannot be ruled out.

The deeply engraved plain cross on both the sides of a circular potsherd reminds one of the plain multiple crosses on seals from Mohenjodaro (Marshall 1931: Pl. CXIV, 520 and 528 B).

A majority of the flaked stone blades recovered from Phase II are of chalcedony. There are, however, a few of chert, which is rare in the region. Thus the abundant chalcedony was used in large quantity for producing blades. Yet the occurrence of the small amount of chert is noteworthy since it was the predominant material used for producing blades by the Harappans during the Mature Phase.

The bead of gold leaf, a rare and costly metal, may represent one of the vestiges of their past richness. A piece of slag indicates metal-smelting activities on the site; although no evidence for a copper-smelting furnace has so far been found.

The occurrence of Late Harappan remains in an area measuring about 20 hectares at Daimabad suggests quite a large settlement of "feeble descendants of the Harappans" in the Godavari Basin, several hundred kilometers from the Harappan homeland. This is the largest of Chalcolithic sites known in the Upper Godavari Basin. The possible population of this settlement is an issue which is being studied. If however, the data collected from the surrounding four villages is a guide it may be tentatively presumed that the population of Late Harappan Daimabad was about 7500. So large a settlement should be classed as a small town rather than a village. Daimabad was thus perhaps the only town in the region, the rest of the settlements being villages.

The excavations at Daimabad by the author have yielded unequivocal evidence of the Late Harappan Phase. This discovery has now paved the way for undertaking studies into a set of crucial problems: (1) the end of the Harappans, (2) the allied issue of Harappan contributions to the Chalcolithic Cultures of the Deccan, (3) the distribution of the Harappan settlements on the Deccan and the extent of the southward movement of the Harappan Culture, and (4) the final form of the transformed Harappan Culture in South and Central India as a whole.

There is no evidence at Daimabad which indicates the transformation of the Late Harappan Culture into a Post-Harappan Culture similar to that at Rangpur in Gujarat. So far the evidence clearly indicates that the Harappans at Daimabad abandoned the site for unknown reasons. Perhaps the desertion was sudden so as not to allow them to carry away the four large bronzes. These were cult objects which they seem to have carried with them from their homeland in the Indus basin as they moved to the Deccan through Gujarat and settled at Daimabad after crossing the Tapti basin. Further movement is clearly implied by this evidence, and coupled with the fact that the Harappans were already in an improverished state when they reached the site we may also surmise that in the course of further movements their cultural equipment was not unlikely to have undergone further change, thus, transforming it into a cultural assemblage quite different from that of the Late Phase with only remote connections to it as a result of changing circumstances and environment.

As the evidence from Daimabad stands there remains much to be studied about the Late Harappans of this place. We need to expose the complete plan of several Harappan houses and better understand the layout of this town. The evidence has shown that the Harappans of Daimabad cultivated wheat, barley, lentils, common peas, and horse gram. But the total picture of the agricultural activities of these people is still very sketchy. The seals with Indus signs have posed a problem concerning the nature of the trade or commerce at Daimabad; that is, if the seals were really meant to be used for commercial purposes. The lump of slag clearly indicates metallurgical activities by the Harappans; but we must know more about these activities in view of the cache of the bronzes mentioned earlier. Although I feel strongly that these bronzes were, as mentioned, brought by the Harappans from their homeland, I also feel it necessary to investigate the possibility that they were manufactured at Daimabad itself. The crescent-shaped potsherd engraved with a scene of a tiger attacking a buffalo, the oval-shaped terracotta cake and the triangular potsherd speak of the religious beliefs of the Harappans of Daimabad, but more evidence in this regard is called for. At Harappa, Kalibangan and Lothal the dead were buried in a cemetery, away from the town. At Daimabad the coffin burial was found inside the settlement. Why, and how, did this change in custom come into being? All these together with other issues will have to be studied in detail.

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JAGAT PATI JOSHI and MADHU BALA

16. Manda: A Harappan Site in Jammu and Kashmir

THE SITE AND ITS LOCATION

THE ancient site at Manda, Akhnoor (lat. 36°54′ north; long. 74°48′ east) lies on the right bank of the River Chenab, a tributary of the Indus, on the foothills of Pir Panjal Range. It is about 28 kilometers northwest of Jammu. One has to climb about one kilometer from the local bus stand to reach the site (Fig. 16.1)

ENVIRONMENT

Most of the ancient site is inside the ruined fort of Manda, which was constructed in the 18th century A.D. The area of the fort is about 500 by 500 meters, the northern side of which is occupied by the Tehsildar's office, police station and other government residential quarters. The rest of the area is covered by the remains of the palace, popularly known as Sheesh Mahal. The eastern area is covered by thorny bushes, wild vegetation and *babul* trees. The elevated mound gives a commanding view.

PREVIOUS WORK

In 1973, consequent upon a request made by the military authorities who accidentally found some ancient pottery and coins at Manda Fort, the North Western Circle (then known as the Frontier Circle) of the Archaeological Survey of India put in three trial trenches. These excavations mostly revealed antiquities and remains of the Kushan Period. However, in 1975, the pottery of various levels was again carefully examined and it was found that fragments of perforated jars, goblets and beakers, dish-on-stand in Harappan Red Ware was also found in the collection. Accordingly, in December, 1976 the site was further explored and examined by a team from the Exploration Branch of Archaeological Survey of India led by the senior author. This team had already excavated at Bhagwanpura (District Kurukshetra; Haryana), Dadheri (District Ludhiana), and Katpalon and Nagar (District Jullundur). It had also explored a large region in the Punjab and brought to light the overlap phase of Late Harappan and Painted Gray Ware (Appendix A). Besides re-examining the site at Manda in terms of its Harappan affiliation, the team was also in search of a further possible extension of the Gray Ware, or overlap period in this area. The exploration revealed the existence of Harappan, Late Harappan Red Ware, Gray Ware, and Black Slipped Ware as well as Kushan Wares[1] at Manda.

EXCAVATION

In order to determine the sequence of cultures at Manda, a 20 by six meter trench was laid on 15 April, 1977 at the highest available point in the mound. The trench had a north-south orientation between the overhead water reservoir and Sheesh Mahal. Deep digging was only done in the northern, central and southern sectors of the trench since intervening Kushan structures had to be preserved. The excavations revealed a threefold sequence in a cultural

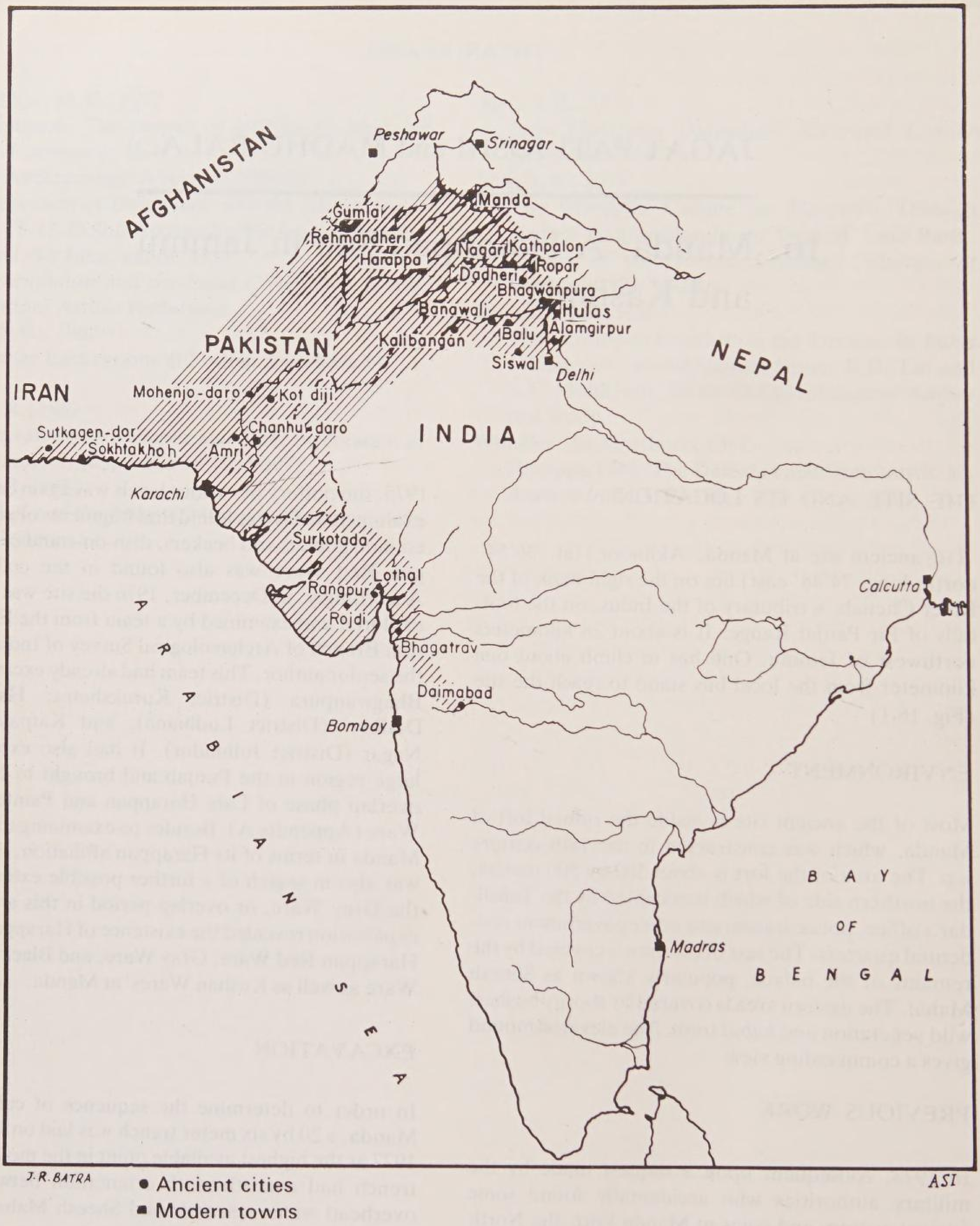

AFGHANISTAN
Peshawar
Srinagar
Manda
Gumla
Rehmandheri
Nagar
Kathpalon
Harappa
Ropar
Dadheri
Bhagwanpura
Hulas
Banawali
Alamgirpur
Balu
Kalibangan
PAKISTAN
Siswal
Delhi
NEPAL
IRAN
Mohenjo-daro
Kot diji
Chanhu-daro
INDIA
Sutkagen-dor
Sokhtakhoh
Amri
Karachi
Surkotada
Lothal
Calcutta
Rangpur
Rojdi
Bhagatrav
ARABIAN SEA
Daimabad
Bombay
BAY OF BENGAL
Madras
J.R. BATRA
ASI
● Ancient cities
■ Modern towns

Fig. 16.1. The extent of the Harappan Civilization.

deposit of 9.2 meters (Pl. 16.1). The deep digging, which brought to light the earlier material, was restricted to small areas.

SUBPERIOD IA

This subperiod is marked by the arrival of Harappans represented by a deposit of one to 1.4 meters with eight layers (i.e., 20-27). It is interesting to note that the pottery is generally from two different ceramic traditions: (1) Pre-Harappan Red Ware, and (2) Harappan Red Ware.

1) Pre-Harappan Red Ware

Statistical analysis has revealed that the Pre-Harappan pottery comprises 15 to 25 percent of the total in the earliest levels (Fig. 16.2). It slowly diminishes in the upper levels of this phase.[2] The pottery is Red Ware with coarse, fine and medium fabrics. Some of the sherds are an ochre color and the slip flakes off due to waterlogging. Most of the pottery has a well-oxidized core and was generally treated with an external red slip. Jars with a featureless rim are represented which are medium to miniature in size. Painting is usually on the neck and shoulder in the form of a thick black band; however thin bands are also available. A few sherds show parallel grooves below the painted surface. This pottery is reminiscent of the Predefense (Wheeler 1947: 59-130) phase at Harappa and Kalibangan I (Fabric C). A rusticated ware (mostly jar fragments) is available which is akin to Kalibangan I Fabric B. A ware deeply grooved on the inner surface, possibly in the form of basins or troughs, is comparable to Fabric D of Kalibangan I. The general feel of the pottery brings it nearer to Predefense Harappa. However the presence of Fabric D is interesting (Fig. 16.3; see also IAR 1962-63: 25-28). One sherd of Reserve Slipped Ware (?) was also found.

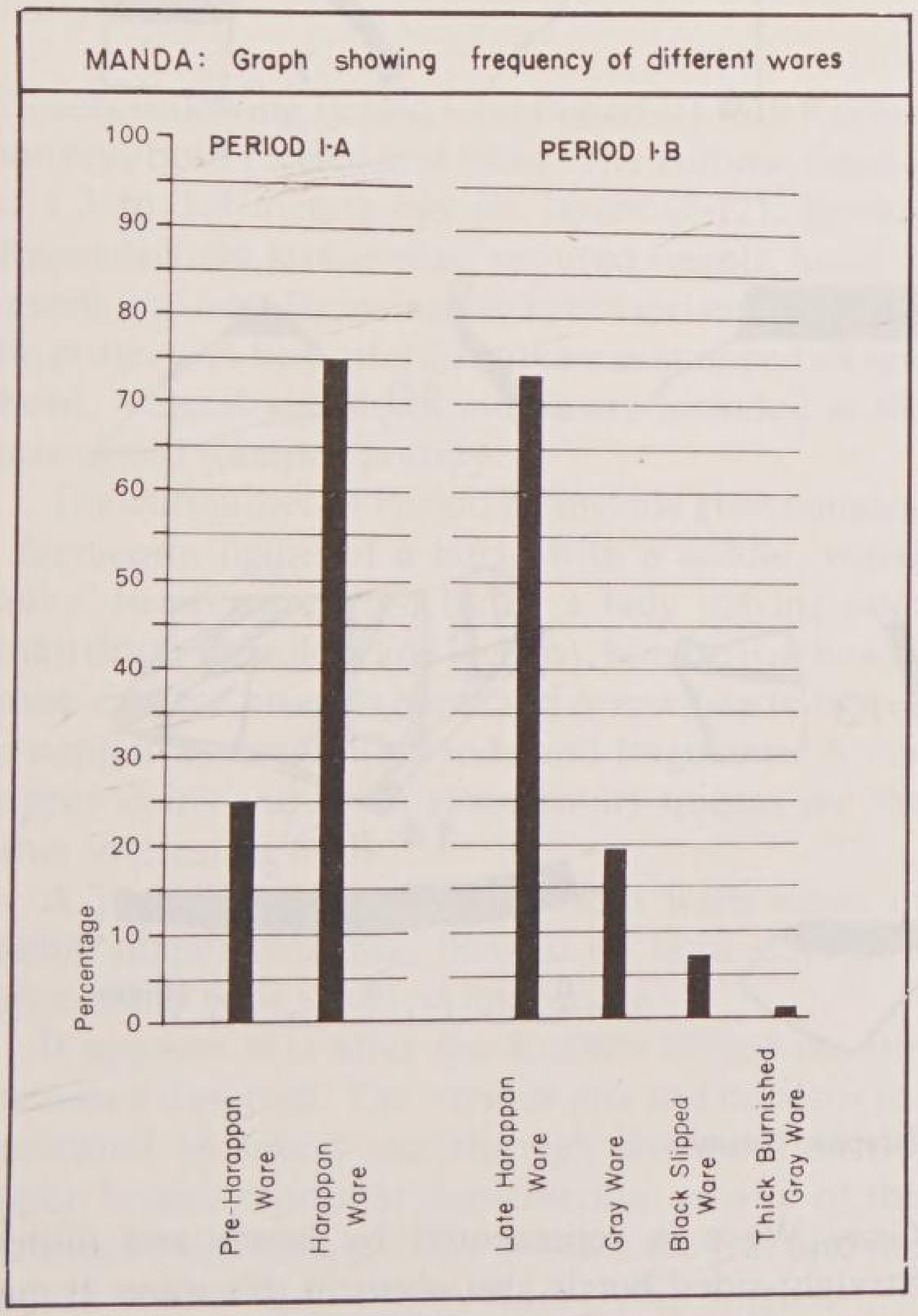


Fig. 16.2. Manda. Graph of ceramic frequencies.

2) Harappan Red Ware

The bulk of the pottery is Harappan sturdy red ware of medium to fine fabric with painted, unpainted and incised (fine grooves) decoration. The shapes are represented by bowls, dishes-on-stand, cups with footed base, goblets, beakers, basins and jars. No perforated jars were found during the present excavation; however the earlier work did produce them. The design repertoire consists of only horizontal bands in black pigment.

A few sherds of Harappan variety Gray Ware were also found.

The antiquities from Subperiod IA include a copper double spiral-headed pin (Pl. 16.2) 12.8 centimeters in length. This object has West Asian affinities (Piggott 1948). There are also bone arrow heads with a tang, clay bangles, terracotta cakes, potsherds with Harappan graffiti, chert blades, an unfinished seal (three by three centimeters) and a few saddle querns and pestles. Considerable rubble in a horizontal accumulation may suggest a fallen wall in layer number 23 of this period.

SUBPERIOD IB

The next period is designated Subperiod IB. It has a deposit of 1.6 to 1.7 meters consisting of two layers (18 and 19). There are four distinct ceramic traditions in this assemblage: (1) Harappan Red Ware, (2) Gray

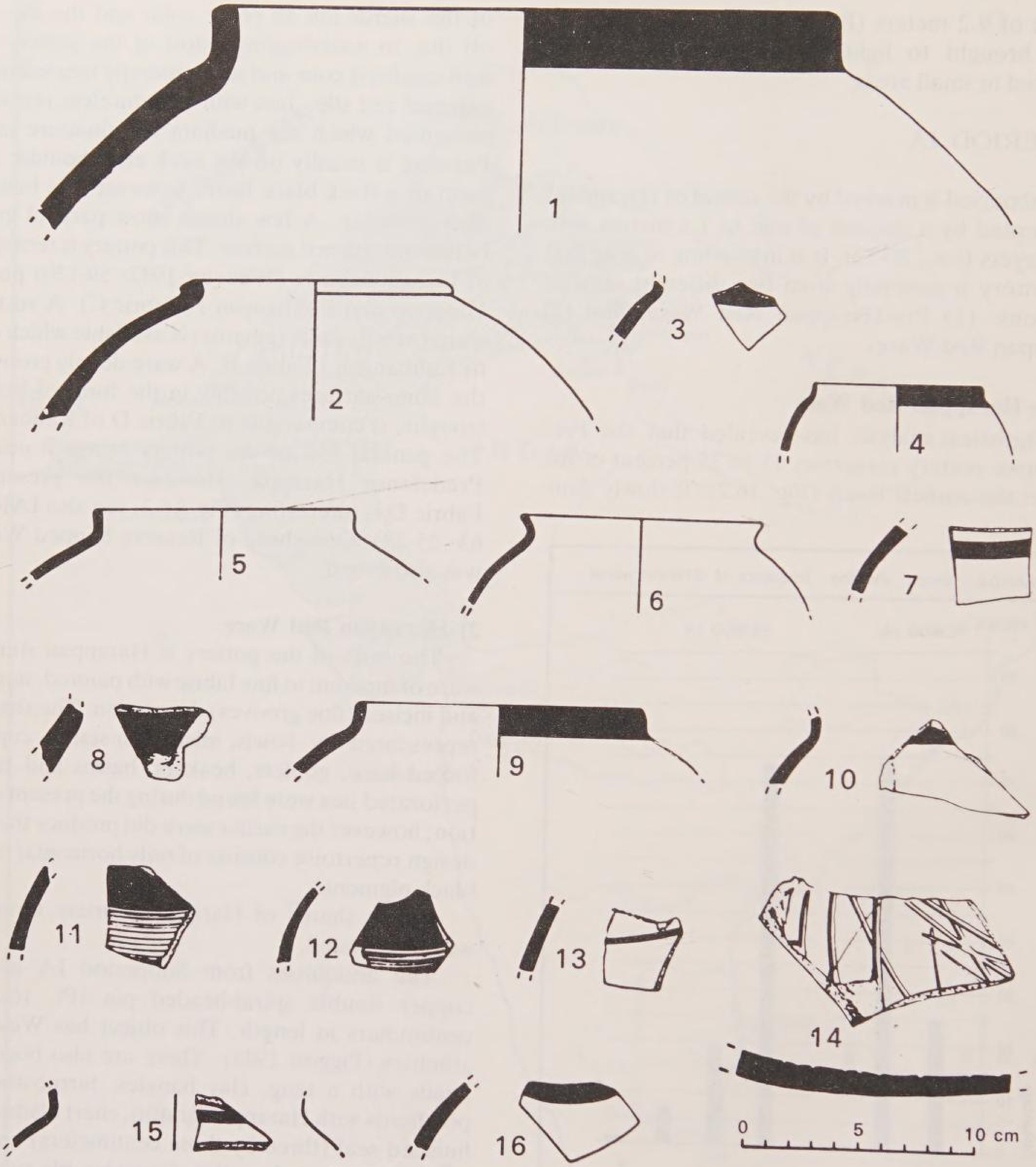


Fig. 16.3. Manda. Pre-Harappan ceramics.

Ware elsewhere generally associated with Painted Gray Ware, (3) a small quantity of Thick Burnished Gray Ware and (4) Black Slipped Ware. No Pre-Harappan Ware is available. Terracotta cakes are also not present. In Harappan Red Ware there are jars, dishes and dishes-on-stand in considerable quantity but beakers and goblets are absent. The Gray Ware is represented by bowls and dishes. Straight-sided bowls also occur in this ware. It may also be mentioned that shapes commonly found in Bara Ware and Cemetery H Ware in varying sites of the Punjab and Haryana were not found in this subperiod during the present excavation. Neither has iron been found in this subperiod. An overall estimation of the ceramics suggests that the Gray Ware generally associated with Painted Gray Ware is seven to 19 percent. Thus there is an interlocking of these two ceramic traditions (Joshi 1978; Madhu Bala 1975) evidently showing the overlap of the two cultures at this site.

PERIOD II

The next period, designated Period II, has a deposit of 1.7 to two meters. There are five layers (13-17) represented by the pottery of the early historical period. This includes dishes, bowls, *handis* with a featureless rim, miniature pots, etc., all in Red Ware. The pottery of this period can be compared with the contemporary types available from many other excavations in northern India.

PERIOD III

Closely following Period II, is Period III with Kushan pottery, both incised and plain. The cultural deposit of 1.7 to 1.9 meters has six layers (7-12). Pottery shapes include jars, dishes, spouted vessels, handled vessels and lids. There is a variety of incised designs in the pottery. A beautiful *swastika* was stamped on one sherd. Vegital and floral motifs are included in the incised and stamped pottery.

The antiquities of Period III include glass bangles, a terracotta figure of a horse with a saddle, votive tanks, beads, stoppers, birds, a lady playing on a small drum (headless and legless), bone arrow heads, stone caskets, iron daggers and arrow heads as well as copper and antimony rods and fragments. A few copper coins and some stone rotary querns are the other interesting finds.

A partially exposed house with walls made of rubble diaper masonry, flanked on both sides of a three-meter wide street, is impressive.

It appears that after the Kushan Period the site remained deserted. The various pits and deposits represented by layers one through six found on the upper levels, represent construction activity of the 18th and 19th century. This is when the fort and the Sheesh Mahal were built by Raja Gulab Singh.

IN SEQUEL

The discovery of the Pre-Harappan pottery with Harappan Ware in Period IA at Manda shows that the Pre-Harappans survived here and coexisted with the Harappans. It is rather significant that this northernmost site of the Harappan Civilization in India has both Pre-Harappan and Harappan remains together in Period IA. To some extent the position is similar to the KLB-2 mound at Kalibangan, where both Pre-Harappan and Harappan remains were found together until the middle levels. Though ^{14}C dates are not available for Period IA the double spiralheaded pin from the middle levels can be dated to ca. 2100 B.C.

There is clear Pre-Harappan evidence in Jammu at Manda. There is also a solitary Red Ware jar with the "horned design" of Pre-Harappan type from Burzhom in the Kashmir Valley. It occurs in a Neolithic context and is a thought-provoking pointer to possible contacts between Neolithic people and the Pre-Harappans. How did this happen? This question needs careful study in future discoveries and analysis. However, it must be borne in mind that chronologically the Pre-Harappans and Harappans are not far removed from the Neolithic time bracket in Kashmir.

At Bhagwanpura and Dadheri the Late Harappan Subperiod is immediately followed by an overlap subperiod (Joshi in press) with Late Harappan Red Ware, Gray Ware and the Painted Gray Ware. But in Subperiod IB at Manda the Mature Harappan Period is immediately followed by the overlap of Late Harappan Ware and Gray Ware. By way of correlation, it appears that the earlier two layers of Subperiod IB of Bhagwanpura are equivalent to Subperiod IB at Manda. At both the places Black Slipped Ware is also available.

The Bara and Cemetery H elements which are available at Bhagwanpura and Dadheri are absent at Manda in Subperiod IB. This may indicate that the intermingling of these elements, or survivals, with the Late Harappans took place only in the Punjab and Haryana and not in the Jammu area. If this is true it is a significant fact since it shows that Manda was beyond the influence of the Barans as such.

Another interesting feature which has come to light in Period IB Manda is the presence of two traditions of Gray Ware: (1) Gray Ware, generally associated with Painted Gray Ware in the Punjab and Haryana, and (2) Burnished Thick Gray Ware. These wares are associated with Late Harappan pottery but without goblets, beakers and terracotta cakes. At this point the evidence from Bhagwanpura IB is significant. Here a Plain Gray Ware precedes by two layers the Painted Grey Ware which is then associated with Late Harappan Ware. At Bhagwanpura the Burnished Thick Gray Ware is not present.

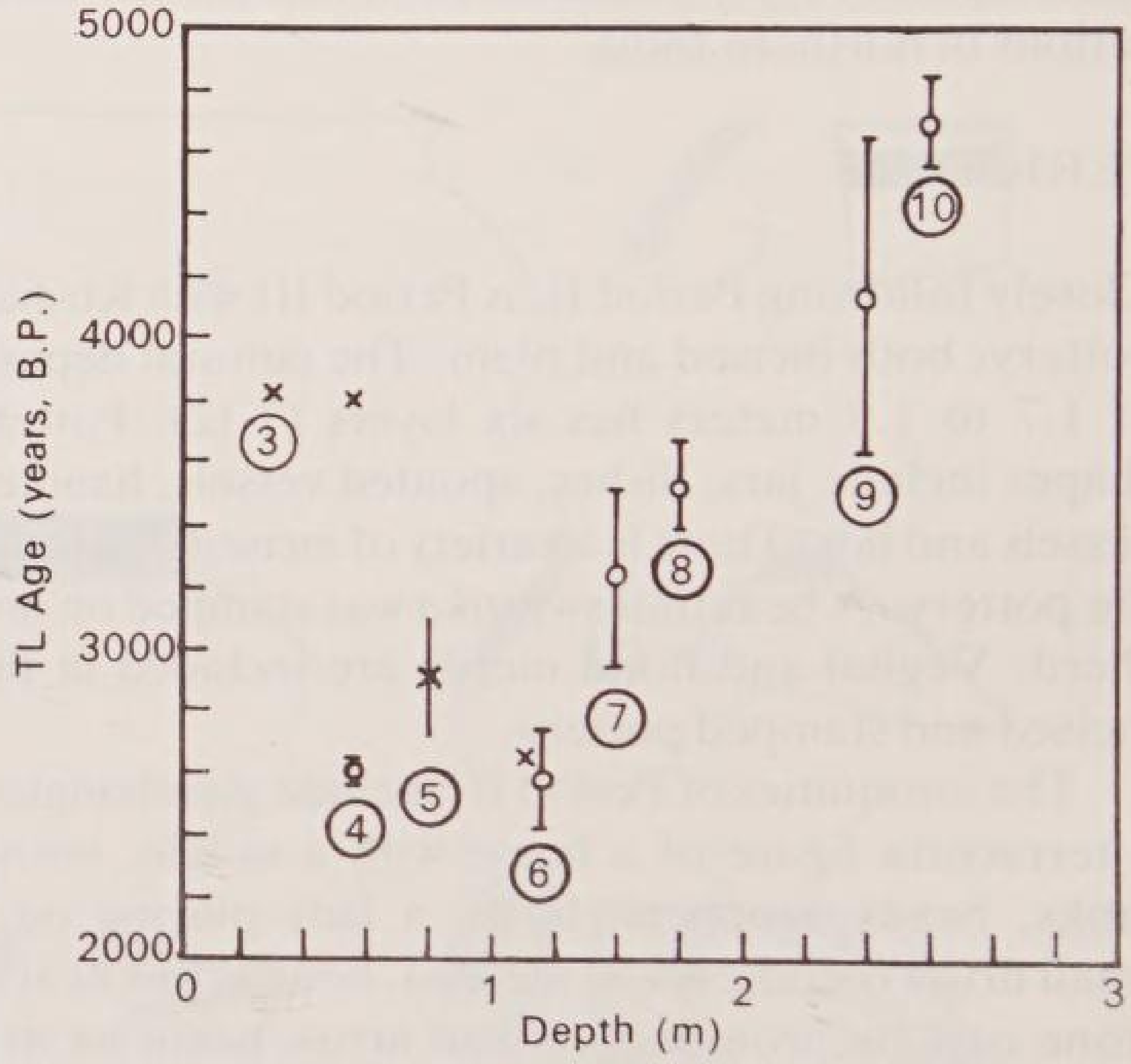
Thus, it appears that the Late Harappans came into contact with a Gray Ware-using people in the first instance and then with Painted Gray Ware people. The time lag is not much but it is meaningful.

A survey of the explored sites in the Punjab, a region which is close to Jammu, suggests that there are a number of Late Harappan sites in addition to those known at Ropar, Kotla Nihang Khan and Charr-Marr-da-Theh. The distribution of these purely Late Harappan sites is: one in Amritsar, three in Jullundur, five in Ludhiana, five in Ropar and six in Patiala. Late Harappan pottery is found along with Painted Gray Ware and Gray Ware at one site in Amritsar, two in Jullundur, six in Ludhiana, twelve in Patiala, one in Ropar and two in Sangrur. Late Harappan pottery with Gray Ware is available at eight sites in Gurdaspur, four sites in Jullundur, five sites in Ludhiana, five sites in Patiala, two sites in Ropar and two sites in Sangrur. Sites with only Gray Ware number eight in Amritsar, ten in Gurdaspur, one in Hoshiarpur, four in Jullundur, two in Ludhiana and two in Patiala. Pure Painted Gray Ware sites are three in Amritsar, six in Jullundur, four in Patiala, fourteen in Ropar and two in Sangrur. Painted Gray Ware with Gray Ware sites number two in Amritsar, one in Hoshiarpur, two in Jullundur, ten in Patiala and one in Sangrur.

The exploration suggests that there are separate sites with the Gray Ware which is generally associated with PGW. These are in District Gurdaspur, where Painted Gray Ware as such is not available. There are presently ten mounds in Gurdaspur with this Gray Ware; however, it is known that as one moves towards the east in the districts of Amritsar, there are eight mounds yielding Gray Ware, four in Jullundur, one in Hoshiarpur, two in Ludhiana and two in Patiala. Thus, the survey shows that separate mounds of Gray Ware become fewer and fewer as one moves from west to east. It has also been observed that at present Painted Gray Ware with Gray Ware and associated Red Ware occurs from Amritsar towards the east. It has been noticed that there is a concentration of Painted Gray Ware sites in District Ropar with four in Patiala, six in Jullundur, two in Sangrur, and three in Amritsar (none in Ludhiana). Patiala District has the largest number of sites—with both Late Harappan and Painted Gray Ware (Madhu Bala 1978).

CHRONOLOGY

No material for absolute dating is available at Manda; however, on the basis of Pre-Harappan Wares the beginning of Subperiod IA can be dated to slightly earlier than about 2350 B.C. and the end of ca. 1750 B.C. The spiral-headed pin suggests a date of ca. 2100 B.C. for the middle levels of Subperiod IA. The beginning of Subperiod IB is then a little earlier than the middle of the second millennium B.C. Manda Subperiod IB anticipates an overlap of Gray Ware with Late Harappan Wares. This compares well with Bhagwanpura IB (earlier levels) where only Gray Ware has been found. As seen in Appendix B (Fig. 16.4) TL dates from Bhagwanpura may support the view. However, it must be borne in mind that Manda did not have a Bara or Cemetery H element. Whereas it is found with the Gray Ware at Bhagwanpura IB.



TL dating results for potteries excavated at Bhagwanpura (x-Gray wares, ⊙-Red wares) (The bars indicate the scatter when more than one determination was made; layer numbers are indicated within circles)

Fig. 16.4. Bhagwanpura. TL dates.

On the basis of the finds at Manda Subperiod IB and Bhagwanpura Subperiod IB (earlier levels) it can be concluded that there was a phase of Plain Gray Ware anterior to Painted Gray Ware (Thapar in press). Both these Subperiods have been found to interlock, individually or together, with the Late Harappan in Jammu, Punjab and Haryana. Since this picture is emerging in a region which is geographically well known in the Vedic Period it appears that one may be nearer to an identification of the culture with one of the waves of the Indo-Aryans. This is confirmed by both geography and chronology (i.e., the middle of the second millennium B.C.).

B. B. Lal has dealt in great detail with the problem of the Indo-Aryan movement. One would like to agree with him when he says: "The full picture has yet to emerge but hopefully will emerge" (Lal in press).

APPENDIX A

BHAGWANPURA

The site at Bhagwanpura (lat. 30°04′ north; 76°57′ east) District Kurukshetra, Haryana is situated on the right bank of River Sarasvati. Excavations at this site, in a cultural deposit of 2.7 meters revealed Late Harappan Culture in Subperiod IA. In Subperiod IB the Late Harappan was found interlocked with the Painted Gray Ware Culture (Pl. 16.3).

SUBPERIOD IA

The occupation of Late Harappans in this subperiod was built over raised mud platforms, evidently to protect the habitation from the floods of the Sarasvati. One such mud platform, measuring 4.25 by 10 meters, was exposed in one of the trenches (Pl. 16.4). This platform was provided with a landing step. After an accumulation of 70 to 80 centimeters of deposit the occupation was damaged by a gigantic flood; however the Late Harappans continued to live at the site.

An analysis of pottery from this subperiod indicates that: (1) there is a Red Ware both plain and painted, (2) an Ochre Color Ware is present but comes mostly from the flood effected trenches, (3) there is an Incised Ware with a variety of designs, some of Pre-Harappan lineage, (4) pottery of Bara type is present, (5) Thick Gray Ware, generally associated with Harappan and Late Harappan assemblages is present, and (6) there are some pottery shapes of Cemetery H. The shapes include dish-on-stand, bowls, dishes, jars with everted rims, flanged neck basins, drooping dishes and button-based goblets and cups. Besides the usual geometric and vegetal designs, *pipal* and banana leaves are also painted on pots. The entire pottery corpus appears to be an amalgam of various ceramic traditions. For example, one can compare the shapes with Bara, Bahadarabad, Atranjikhera, Hulas, Siswal IIB, Daulatpur and Raja Karan-ka-Qila.

The antiquities of this subperiod include a terracotta bull with long horns and pinched up hump, a gray to black terracotta consisting of the leg portion of a deity or a human figure, and two more anthromorphic figurines (Pl. 16.5), wheels with hubs, bangles, copper rods and pins, faience beads and bangles, beads of semiprecious stone and bone pins, etc.

SUBPERIOD IB

Though no stratigraphic break could be discerned, this subperiod is marked by the continued occupation by the Late Harappans and the arrival of Plain Gray Ware using people followed by the Painted Gray Ware using folks. After an accumulation of this overlap culture, some of the habitation was washed away by a flood. This calamity did not prevent both the Late Harappans and the Painted Gray Ware using folks from continuing to live at the site. However, it has been noted that the Late Harappans gradually diminished; but they did not vanish till the end. This may be due to the superiority of the Painted Gray Ware people who slowly entrenched themselves at the site in the late levels of Subperiod IB. During this period of overlap three phases of structural activity could be identified.

At first the people were living in round or semicircular thatched huts (Pl. 16.6). Inside one of the huts we found four saddle querns and different types of pestles on the floor. This may indicate that the house belonged to a corn grinder.

An oval structure of highly burnt earth with a northeast to southwest orientation is also associated with this phase. The structure measures 2.75 by 1.25 meters and has a 10 to 50 centimeter-thick wall and inner depth of 50 centimeters. A large number of pieces of burnt earth, a few potsherds in a sturdy Red Ware and some dome-shaped terracottas, perhaps belonging to the collapsed roof of the structure, were found inside the structure (Pl. 16.7).

In the second structural phase a complete walled house complex with a thick (0.7 to one meter) wall was found (Pl. 16.8). This appears to be a well planned house with 13 rooms. There is a corridor between two sets of rooms and a courtyard on the eastern side. The size of the rooms varies from 1.6 by 1.6 meters to 3.35 by 4.2 meters. Copper objects, faience bangles and beads, terracotta *ghata*-shaped beads, bone styli, terracotta figures, Painted Gray Ware (Pls. 16.9 and 16.10) Plain Gray Ware vessels and Late Harappan pottery were found in this building. A statistical analysis of the pottery revealed that two to five percent of the total corpus was Late Harappan in the rooms of the houses. This shows some social contact between the two groups of people. Two oval shaped structures, size: (1) 1.8 by 0.85 meters, (2) 1.6 by 0.92 meters, are also associated with this phase.

In the third structural phase the houses were built of baked bricks (Pl. 16.11). Vigorous ploughing activity has left no structures but bricks that were found *in situ* are the following dimensions:

1) 1.2 × 12 × 18 cm
2) 12 × 12 × 8 cm
3) 29 × 22/12 × 1/2 cm (wedge shaped)
   20 × 20 × 8 cm
4) 16 × 12 × 4 cm

Some of the bricks have deep finger marks.

BURIALS

Two skeletons were found in the habitation area of Subperiod IB. Both skeletons had a north-south orientation, with the head to the north, and the face turned to the west. The graves were devoid of any funerary goods. Field study of skeletons made by Shri A. K. Sharma showed that one (Pl. 16.12) of them was an adult of advanced age and the other was a child, of eight to ten years.

Besides the continuance of Late Harappan pottery and antiquities, Subperiod IB yielded Plain Gray Ware in the early levels followed by Painted Gray Ware. PGW is associated with a Red Ware and a limited quantity of a Black Slipped Ware. A Painted Gray Ware with designs in thick lines, is also available from the early and middle levels of the subperiod. The design repertoire is very rich in the Painted Gray Ware (Pl. 16.9) tradition. It includes dots, slashes, horizontal bands, wavy lines, concentric circles, intersecting circles, net designs, honeycomb design, fish scales, lotuses, etc. A unique maltese cross and a set of intersecting circles forming a six- or four-petaled flower have come from Bhagwanpura IB. Gray Ware shapes are: bowls, dishes and straight-sided bowls and basins. It has been noticed for the first time that a few Late Harappan shapes (e.g., bowls, basins, dishes, jars and dish-on-stand) were copied in the Gray Ware.

Other important finds of this subperiod include terracotta anthropomorphic figures with parallels to objects found in the Gandhara Grave Culture I in Pakistan. There is a one-wheeled anthropomorphic figure, wheeled incised terracotta rams (Pls. 16.13, 16.14 and 16.15), birds, dogs, wheels with or without hubs, hopscotches, decorated dishes, ear ornaments, dabbers, violin-shaped Gray Ware mother goddess (Pl. 16.16) used as pendants, bone and ivory needles, pins and styli and one stylus with black pigment on its tip. Some of the bone pins have a very fine polish. Glass bangles in sea blue, white and black are the most impressive finds. Copper bangles, rods, and some indeterminate pieces have also been found. A seal with incised graffiti of Harappan lineage is also available. A large number of terracotta *ghata*-shaped beads, incised biconical beads, decorated faience beads and semiprecious stones deserve special mention. A bull-shaped carnelian pendant, although found on the surface, is most exquisite. Remains of *Equus cabalus* Linn. is another important discovery.

DADHERI

The excavations at Dadheri (lat. 30°40′ north; long. 16°15′ east) District Ludhiana, Punjab have yielded a threefold sequence in a cultural deposit of six meters. In Subperiod IA the Late Harappans built a settlement of huts and mud-walled houses over solid rammed mud platforms. Evidence of a mud wall running east-west in an oblique fashion with a length of 1.7 meters and a width of 0.59 meters has been found. Post holes suggest that people were also living in huts (Pl. 16.17). Evidence of a flood during this period was also recorded. The Late Harappan is represented by a sturdy Red Ware, both painted and plain. The shapes include jars, dishes-on-stand, etc. The design repertoire consists of horizontal bands, crisscross patterns filed in at the arches, hatched lozenges, etc. A large jar with a painted and incised design is one of the most fascinating finds from this level (Pl. 16.18). A considerable amount of incised pottery with a Pre-Harappan lineage has also been found.

Small finds include faience bangles, terracotta wheels, beads, and a painted bull. Copper objects and beads of carnelian and lapis lazuli were also present.

The pottery obtained from Subperiod IB included Painted Gray Ware, Gray Ware, Black Slipped Ware, an associated Red Ware and Late Harappan Ware. The percentage of Black Slipped Ware is much more than that found at Bhagwanpura in a similar context.

The antiquities include faience bangles, beads of semiprecious stone, terracotta wheels and a copper ring. No iron has been found.

In Subperiod IB the excavations have revealed evidence for interesting house types. At first the people were living in semicircular huts as attested by the discovery of post holes. Three oval structures of burnt earth, perhaps of religious character (Pl. 16.19) also came from this phase. These structures probably had a domed roof. In the next stage the houses were built with mud walls. A complete room measuring 1.1 by 2.5 meters from a house-complex has been exposed. The last phase is represented by a wall made of brick bats and brick jelly. Two sizes of bricks with finger impressions have been found. The sizes are: (1) 12 by 12 by seven centimeters, (2) 25 by 20 by five centimeters.

The site was deserted for a long time after Subperiod IB. However, a few sherds of Kushan affinity have been found but no regular habitation as such could be discerned by the present excavation in Period II. The latest Period III represents medieval times.

KATPALON AND NAGAR

Excavations at Katpalon (lat. 31°05′ north; long. 75°52′ east) District Jullundur, Punjab have brought to light a sequence of three cultures in a deposit of six meters. In Period I, Painted Gray Ware has been found interlocked with the Late Harappan Culture. An oval structure in a dilapidated condition was also found in this period. Other finds include copper and antimony rods, terracotta beads and wheels. Late Harappan Ware, Painted Gray Ware and Gray Ware were also there. The succeeding periods, after a break, are Kushan and medieval.

At Nagar (lat. 31°05′ north; long. 75°50′ east) Jullundur District, Punjab has a cultural deposit of five meters. A sequence of three periods has been brought to light. Period I yielded Late Harappan Ware, Painted Gray Ware and Gray Ware. Two oval structures and post holes indicate round and semicircular huts. Other finds include copper objects; bone styli; terracotta animal figurines and ear ornaments in addition to bangles and beads.

Period II is the early historic and Period III belongs to medieval times.

APPENDIX B

TL DATES FROM BHAGWANPURA (Fig. 16.4)

Dr. K. S. V. Nambi, Dr. R. Sasidharan and Dr. S. D. Soman of the Health Physics Division, Bhaba Atomic Research Center, Bombay, kindly undertook the task of TL dating material from Bhagwanpura (Nambi, Sasidharan and Soman 1979). To aid comparative study and build up hypotheses, extracts from the report are reproduced below. The Red Ware (RW) mentioned in the report is the Late Harappan Red Ware and Gray Ware (GW) also includes Painted Gray Ware.

TL AGES OF BHAGWANPURA POTTERIES

Among the 18 samples excavated, grey wares occur only in the first six layers (up to a depth of about 1.3 m); the red wares are seen less frequently in these layers, but occur exclusively in all layers beyond 1.3 m depth. Fig. 6 shows the TL ages obtained for the grey wares and red wares collected from different layers. A striking difference in the age patterns of the types of wares is quite evident; the GW ages decrease with depth in the region of 0.3 to 1.2 m during which the RW ages remain more or less the same corresponding to the lowest GW age obtained viz., about 2600 years, B.P.: the RW ages on the other hand, increase systematically with depth. (It should be pointed out here that only those RW age results for which more than one estimate could be made have been represented in Fig. 6 [ed. note: Fig. 4 of this report]). Perhaps the red wares belong to the old resident people native to the site and the grey wares to a later settlement, the change-over occurring somewhere between the sixth and seventh layers i.e., between 2600 and 3200 years ago. Bhagwanpura being an ancient site in the domain of the famous Indus Valley civilization, one is reminded of the overlap phase between the late Harappan and Painted Grey Ware cultures that is datable to *circa* 1500 B.C. to 1000 B.C. (ASI, 1978) which is quite close to the TL ages mentioned above.

There remain some six samples (BPR-4, 7, 8, 12, 16 and 18) whose TL ages do not conform to the general trend presented in Fig. 6. It is left to the archaeologists either to reject them totally or partially depending upon individual sample considerations they may have.

TL ages estimated for the Bhagwanpura potteries

Sample code	Depth of find (meters)	TL age year B.P.* (std error, predicted accuracy)
BPR- 1	0.3	3830 (± —, ± 13%)
- 2	0.8	311 (± —, ± 15%)
- 3	0.8	2710 (± —, ± 15%)
- 4	0.55	4038 (± 4%, ± 13%)
- 5	0.55	3814 (± —, ± 14%)
- 6	0.55	2617 (± 1%, ± 16%)
- 7	0.55	1344 (± —, ± 13%)
- 8	0.9	1235 (± —, ± 15%)
- 9	1.1	2649 (± —, ± 15%)
-10	1.15	2742 (± —, ± 16%)
-11	1.18	2434 (± —, ± 17%)
-12	1.3	4868 (± —, ± 12%)
-13	1.4	3241 (± 9%, ± 13%)
-14	1.6	3532 (± 4%, ± 12%)
-15	2.1	4141 (±12%, ± 15%)
-16	2.25	5460 (± —, ± 15%)
-17	2.4	4696 (± 3%, ± 17%)
-18	2.45	3024 (± —, ± 15%)

*Date of measurement: 1978

ACKNOWLEDGMENTS

Grateful thanks are due to all of our colleagues in the Exploration Branch of the Archaeological Survey of India for their kind cooperation and help in the field and headquarters in the preparation of this paper.

Finally, the authors express their thanks to Sarvashri J. R. Batra and Vijay Kumar for the drawings and Sarvashri Dhan Pal and H. L. Khatri for neatly typing the paper.

NOTES

[1] With a view to understanding the problem of the relationship of Late Harappan Culture with Painted Gray Ware Culture, excavations at Manda, Bhagwanpura, Dadheri, Katpalon and Nagar and explorations in Jammu and the Punjab were carried out during the field seasons between 1975 and 1977 by a team of the Explorations Branch of the Headquarters Office of the Archaeological Survey of India under J.P. Joshi assisted by Miss Madhu Bala, Sarvashri J.R. Batra, S.N. Jayaswal, G. Laxminaryana, J.Dey, Vijay Kumar and Manohar Lal. Shri A. K. Sharma had exposed and made a field study of human and animal skeletal remains from Bhagwanpura. The material for TL dating from excavations at Bhagwanpura was collected by the present authors and was later analyzed by K. S. V. Nambi, R. Sasidharan and S. D. Soman, Health Physics Division, Bhaba Atomic Research Center, Bombay.

[2] Statistical analysis has been done by Miss Madhu Bala.

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Y.M. CHITALWALA

17. Harappan Settlements in the Kutch-Saurashtra Region: Patterns of Distribution and Routes of Communication

THERE is much about the Harappan Civilization which needs to be explained on a scientific basis. But, still one has to be virtually a multiprogrammed computer with data for in-depth studies on such topics as the mechanism of urban growth, geopolitical and sociological explanations for the spread of the Indus people, their settlement and community patterning, economic development and its socioreligious implications. There are many seemingly disparate components of the Harappan Culture that need to be fitted into a logical scheme. One of the important aspects of this culture is the apparent mobility of the Harappans and their proliferation over great distances: from the Afghan/Baluch areas in the north to the borders of Maharashtra in the south. These territories constitute a number of ecozones with different environmental variables and economic incentives which the Harappans had to deal with. It is, therefore, of interest to understand their distribution pattern in the Kutch-Saurashtra region and the mechanisms operative behind this spread.

GEOGRAPHICAL AND ENVIRONMENTAL SETTING

Outside the Indus Valley proper, and territories comprising much of what is Pakistan today, Kutch and Saurashtra have one of the densest concentrations of Harappan settlements anywhere. However, while Kutch and Saurashtra are ecologically speaking, a contiguous unit, geomorphologically and environmentally they stand apart. Kutch forms an intermediate area between Sind and Saurashtra. The Ranns, the great level expanses of salt and sand, separate Kutch from Sind in the north and from Saurashtra in the south. The sea on all sides except in the east, turns Kutch into a kind of closed system. The Ranns are not deserts in the sense the Thar or the Sahara are. They are vast plain-like stretches of sand leveled to an asphalt-like consistency by salty efflorescence and brine. During the monsoons and until the onset of winter, they remain waterlogged and difficult to cross. Another characteristic of the landscape is that Kutch is dotted with low hills. The overall effect of the Ranns, hills, and the sea combined, is one conferring a sense of security.

The most significant rock formation that has direct bearing on the lives of people are sandstones. These are veritable storehouses of underground water. Kutch can survive repeated droughts only because of its reserves of subsoil water. There are no large perennial rivers today; however near the Kori Creek in the northwest, the channel of an effluent of the Indus can be traced up to the Allaha Bund. This was thrown up by an earthquake and cut off the flow of water from the Indus system into Kutch. In the past, the drainage pattern of Kutch, with its overall effect on the configuration of the Ranns, seems to have undergone changes of a rather drastic nature.

As far as Saurashtra is concerned, it shares with Kutch a long coastline with many favorable points for anchorage, but it is not as severely isolated from the rest of India. The preponderant rock formation is basalt, or Deccan Trap, from which the famous black cotton soil is derived and which was possibly one of the more important factors influencing the choice of Harappan site location. The drainage pattern of Saurashtra is radial, with rivers flowing to the sea in all directions from the central hilly region. The larger rivers, like the Bhadar, are perennial and have large tracts of agriculturally rich black soil along their banks. Incidentally, quite a number of large Harappan settlements are located on the banks of the Bhadar.

DISTRIBUTION OF HARAPPAN SETTLEMENTS

The distribution of Harappan settlements in Kutch and Saurashtra differs markedly. Considering that Kutch is only slightly smaller than Saurashtra, the Harappan settlements are few and far between—and most of these are concentrated in eastern Kutch, locally known as Vaged. This is the point nearest to northern Saurashtra. Kotada Dholavira in Khadir and Surkotada appear to be the largest Harappan sites in Kutch, though the former is considerably larger than the latter. Both these sites have evidence for Mature Phase Harappan occupation, as well as the Late Phase. By Mature Phase is meant that the sites did not have any evidence for the general decline in the standard of living from a level comparable to that witnessed at Mohenjodaro or Harappa. There are a few divergences from Harappan norms but these are due to a change of environment and economy. For example Surkotada is not as extensive a city as is Mohenjodaro. In fact it is a small fortified settlement functionally meant to serve as a military outpost (Joshi 1979: 64). As far as Dholavira is concerned, it is located on the margin of the Great Rann of Kutch and therefore, is in the nature of an entrepôt for the Harappans coming from Sind across the Great Rann. Khadir is today an arid land with brackish water in most of its wells. Agriculture is possible only on some patches of ground where sweet water is available. The villages are small and the population seems to be straining the carrying capacity of the environment. The present population of Dholavira, which is near the Kotada mounds, is 750. In view of this fact, it remains to be explained how a large urban settlement, with an area of about two-and-a-half square kilometers, could flourish some 4,500 years ago in such an inhospitable environment.

Pabumath is yet another site located on the margins of the Rann. It is a small Harappan settlement measuring 150 by 150 meters. It is about 20 kilometers from Dholavira as the crow flies. The site has undergone brief excavations and has yielded evidence of four phases of construction. Most of the house foundations are of undressed stone, which remain unchanged from one phase to the next. Before the first phase of construction, the Harappans seem to have cleared the jungle by burning. On top of this burnt layer, they laid the foundations of their first settlement. They came to the site with mature skills for laying house foundations. Since the site is near Dholavira across the Rann, regular communication between the two settlements is likely. The find of a seal with Harappan characters and the "unicorn" motif may add weight to the hypothesis.

As far as the interior part of Kutch is concerned, there is a total of five sites. Desalpar in the northwest is the only excavated site in this group. The site of Khirasara in Nakhatrana Taluka has yielded seals and is a fortified settlement. Then there is the site of Bhedi near the village of Kothara in central Kutch and another near the village of Kakadbhit some 40 kilometers west of Bhuj. Only one coastal site has so far been noted. This is near the village of Navinal near Mundra on the Gulf of Kutch. Of these five sites, Desalpar and Khirasara have yielded evidence for Mature as well as Late Phase occupation. The other three sites were no more than hamlets of the Late Phase of Harappan Culture. The coastal site of Navinal has a deposit only one meter deep. The pottery, including the convex-sided bowl, compares well with the Late Phase of the Saurashtra Harappan. The convex-sided bowl is less frequently found at the Mature Harappan sites in Kutch. Even in Saurashtra this bowl becomes almost a type fossil, with its typically blotchy decoration at Prabhas. This would imply that of all the pottery shapes, the convex-sided bowl became more popular in the later part of the Harappan existence and eventually underwent regional metamorphosis at Prabhas, located on the southern seaboard of Saurashtra.

In Saurashtra the larger excavated sites of the Harappan Culture are those of Lothal, Rangpur and Rojdi. All of these have yielded evidence of Mature as well as Late Phases. Scores of smaller settlements have been found at places like Atkot, Traghda and Hajnali. Excluding Hajnali, most of these small sites belong to the Late Phase. Of 25 sites reported from Kutch, only two or three are exclusively Late Harappan, and none are Post-Harappan, comparable to Rangpur Period II C. The number of sites of Rangpur Period II A (Mature) in Saurashtra increased from 18 to 120 in Period II B-C. This has been attributed in the one place, to an increase in population and secondly, due to a shift in the pattern of land use from *rabi* to *kharif* crops (Possehl 1974: 177-78; Chitalwala 1977: 95). The introduction of *bajra* (*Pennisetum typhoides*) in the Late Harappan Period, corresponded to an increase in population. This added pressure to the environment, led to an intensive system of cropping, and the year round use of land to accrue maximum benefit (Rao 1963: 168-69; Leshnik 1973: 72; Possehl 1974: 153-54; Chitalwala 1977: 96).

It would seem that initially Kutch had all the economic incentives to make the Harappans settle in large urban centers like Kotada Dholavira and strongly garrisoned outposts like Surkotada. Later, however, they found that its economic potential had dwindled and they had to move elsewhere. The paucity of Late Harappan sites points to this fact.

THE PATTERN OF HARAPPAN COMMUNICATIONS

The Harappan Culture has a north-south axis from the hilly Afghan/Baluch areas to the borders of Maharashtra, south of Gujarat. There are four distinct geophysical and ecological zones along this axis. The first two, the Afghan/Baluch areas in the north and the second zone in the Indus Valley and the Makran Coast, form a single land mass. The Ranns together with mainland Kutch make the third zone. To the south lies the final zone, the black soil areas of Saurashtra, mainland Gujarat and Maharashtra with their predominantly basaltic formations. Of these four zones, the second and fourth have environmental variables favoring an agrarian economy. This was the mainstay of Harappan subsistence. Consequently, the Harappan site scatter is densest in these two zones and sparse in the Afghan/Baluch and Kutch zones. In view of this, the nature of the economy at settlements like Dholavira (Khadir) in Kutch must have been based on different incentives than those obtained elsewhere, say in Sind and Saurashtra. The location of Dholavira on the margins of the Rann is quite important in this context. Simple analysis indicates that first, a large urban settlement cannot, by any stretch of imagination, be located next to a hot and howling desert-like environment. Second, Khadir is far too arid to support a large population that is particularly adapted to agricultural pursuits. Third, given the present conditions, the Ranns, which become waterlogged for almost six months in a year, would have made the life of an urban settlement impossible by completely isolating it from the rest of Kutch, and for that matter the rest of India including Sind. The incoming water from the sea during monsoon is too shallow to be negotiable by boat, and too slushy to enable a horse ride. Only camels can trudge along at a snail's pace. These are all geographical and economic disincentives for locating a large township in Khadir. But the fact remains that the edge of the Rann was selected by the Harappans for the location of a major settlement. The relevant question therefore becomes: was the Rann during Harappan times geomorphologically what it is today?

The tradition of the Ranns being an arm of the sea is both persistent and persuasive. Those who live in small villages on the margin of the Ranns speak of ships sailing across their waters bringing goods from distant lands. They nostalgically speak of a rich and benevolent merchant named Jagdusha and his ships with full consignments of gold in their holds, anchoring at many points along the shores of the Ranns. However, no one knows exactly when the Rann was actually a part of the Arabian Sea. Writing in 1907, Robert Siverights refers to Alexander Burnes who learned "That vessels had been known to be wrecked on Pacham and that they came for shelter in heavy weather to the *island* of Khadir" (Siverights 1907: 531). Siverights further says that the Rann was navigable for many hundred years after the Arab conquest. But, by 1361 it is learnt from the historian who accompanied the Sultan Firuz Shah in the year that he led the expedition to Gujarat "the intervening area that was once a marsh was now 'a howling desert'" (Siverights 1907: 531). Siverights, however, does not mention who the historian of Sultan Firuz Shah was, or where he found this reference to Kutch. Mallinath, the great literary critic of the 14th-15th centuries, also mentions Kutch as a marshy region (Gazetteer of India 1971: 1). It is, therefore, clear that in the 14th century the Ranns were what they are at present; although no earlier literary information is available.

Investigations of a purely scientific nature in the spheres of hydrology, archaeology and geology suggest that the Ranns were indeed under a permanent sheet of water at a time when the Harappan Culture was flourishing in Kutch. Based on hydrological studies, S. K. Gupta maintains that "even as late as 2000 years ago Little Rann was about 4 m deep" (Gupta 1977: 205). Geological studies carried out by Roy and Merh bring out the fact that the River Luni, which now flows from Rajasthan and merges into the eastern margins of the Rann of Kutch, once had a greater stream flow (Roy and Merh 1977: 198). Greater flow of fresh water into the Ranns should, in fact, be historically a part of the entire drainage pattern. A greater quantity of fresh water coming into the Ranns would have kept the levels of salinity low and this would mean less salinity of the subsoil water. At present Khadir has reserves of subsoil water, but its high salinity makes it unfit for agriculture or domestic use. If a time is postulated "when the subsoil water was not saline, then a large population can subsist without constraining the carrying capacity of the region" (Chitalwala 1977: 6). Wetter phases of climate during the Harappan Period have been postulated over Rajasthan and western India on the basis of palynological studies carried out by Gurdip Singh (Singh 1971). Withdrawal of this wetter phase over Rajasthan, and possibly Gujarat, must have brought about changes in the ecology, drastically altering the economic infrastructure of the Harappan Civilization in these areas (Chitalwala 1977).

The locational aspect of Dholavira in Khadir has already been discussed. This large Harappan settlement has a twin-mound system of planning. On the mounds one can see ring stones of the type found from Lothal. These were called anchors by Rao (1973). Apart from this, a prosperous industry in making shell objects seems to have been at the site. Numerous pieces of shell bangles, shell discs, ladles and fragments of large marine shells occur on the surface. Today, the nearest seashore to Dholavira would be somewhere near Kandla and Mundra in the south some 100 kilometers away by the shortest route. Since there is no trading post of importance on the southern seaboard of Kutch, a regular trade in seashells cannot be postulated. From excavations at Pabumath, the site nearest Dholavira on the Rann, many objects of shell have been found. Bones belonging to large marine fish (weighing 20 kilograms or more on the basis of vertebrae) have also been found. These facts indicate that the sea was quite near at hand and that exploitation of marine resources was economical.

On the Saurashtra side the small Harappan site of Hajnali is quite interesting. It is located near the junction of the Little Rann, Gulf of Kutch and Saurashtra. At present the site is three kilometers inland from the Gulf. It measures only 60 by 60 meters but has three meters of occupational debris. It does not appear to be a normal habitational mound like a village or a town. From its shape and size it seems to have been made up of a group of large structures; in the manner of a trading post. In fact its location is ideal for discharging such a function. During high tide the waters of the Gulf come close to the site and it seems that in the past it was actually on the Gulf. With the recession of sea level it now stands inland. The name Hajnali is also suggestive in this context. It means "the place of embarkation for pilgrims bound for Haj." Likewise Lothal, with its dockyard and industrial township, is located much inland today, on the southern shore of Saurashtra. The recession of sea level thus had a twofold effect on the Harappan settlements in Kutch and Saurashtra respectively. Settlements like Dholavira and Pabumath, which stood on the seashores during the Harappan times, are now on the margins of the Ranns. Sites like Hajnali and Lothal, also once located on the seacoast, now stand further inland. A study of eustasy suggests there might have been a phase of regression in the level of the sea between 5000 and 3000 B.P. which corresponds with the eclipse of the Mature Phase of the Harappan Civilization (Agrawal and Guzder 1972: 216-22).

Based on the location of Dholavira in Khadir to the north, and Lothal in the south, it can be concluded that these settlements were engaged in sea trade between Sind, Kutch and Saurashtra. Lothal was also trading with the Persian Gulf. It was this interregional and international trade that formed the base of their economy. With the regression of sea level these port cities were left high and dry and their *raison d'etre* (i.e., seabound trade) was lost and their industrial structure destroyed.

This discussion of the Ranns of Kutch and the location of Harappan sites, yields important inferences regarding the routes of Harappan communication between Sind and the Kutch-Saurashtra area. We have examined the evidence that the Ranns were once an extension of the sea. This would make Kutch wholly separate from both Sind and Saurashtra. It would, therefore, appear that all Harappan communications between Sind and Kutch and between Kutch and Saurashtra were essentially seaborne. The port of Dholavira was possibly in trading contact with the Harappan sites like Sụktagendor and Sotkakoh on the Makran Coast. Allahdino near Karachi is yet another site which appears to have been a settlement of commercial nature with a "staggering quantity of all artifact categories. Such items as biconical ball, ceramic bangles, toy-cart frames, terracotta triangles and cakes have been found in quantities exceeding 10,000 each" (Shaffer 1979: 25). The number of copper objects found from Allahdino, considering its comparatively small size, also points to the commercial nature of the settlement. It would, therefore, be quite logical to infer that Harappan coastal settlements like Dholavira and Lothal in Kutch and Saurashtra communicated with their counterparts on the Makran Coast. The communication between Dholavira and other Harappan sites, like Pabumath in Kutch, were also carried on across the sea since Khadir was an island. Overland communications were confined to internal contacts between one Harappan settlement and another within Kutch and Saurashtra. One such overland route can be postulated between Pabumath via Lakhapar, Kerasi and Surkotada down to the Little Rann, or the sea as it was during the Harappan times. Another overland route would have started from Desalpar, then moved down to Khirasara and to the south to Navinal on the Gulf of Kutch. The site of Hajnali on the Gulf of Kutch on the Saurashtra side was an entrepôt for cultural and commercial contacts directly from Sind and from across the Gulf. An overland route might have run from Hajnali to Rojdi and along the Bhadar Valley via Atkot to Rangpur and thence to Lothal.

CONCLUSIONS

First and foremost, there is compelling evidence for the Ranns being an area that was under a permanent sheet of water during the time of the Harappans. Only as late as the 14th century it is referred to as being a marshy "howling desert." The combined spectrum of geological, geomorphological and palynological evidence suggests that during the Harappan Period a greater part of western India enjoyed a wetter climatic phase. Riverine stream flow into the Ranns was thus greater than what it is today. Subsequently, with the onset of a dry phase and with the regression of the sea level, the Ranns came into existence and those Harappan settlements which had originally been on the coast found themselves some distance inland. This may be one of the reasons why their economy declined. Second, most of the Mature Harappan settlements in Kutch and Saurashtra were a part of an extensive trading network beginning in Sind. Third, the Harappan settlements in Kutch, like Dholavira and Surkotada, were more dependent on trade and industry than on a purely food-producing economy. Fourth, communication appears to have been on three different lines: (a) overland communication was used between one settlement and another within Kutch and Saurashtra—this communications network was purely regional; (b) contacts between Sind and Kutch, Sind and Saurashtra, and Kutch and Saurashtra were seaborne and essentially inter-regional; (c) the third type of communication was international, involved with overseas trade between Harappan settlements like Lothal, and the Persian Guff. Finally, it would be erroneous to assume that when the Harappans arrived in Kutch and Saurashtra they found these areas already populated and by subjugating these populations they founded what is often referred to as the "Harappan Empire." The small number of Harappan sites in Kutch and Saurashtra during the Mature Phase, and their nearness to one or another route of communication, does not indicate any extension of the Harappan state. These areas were either very sparsely populated, if the evidence of Micaceous Red Ware is anything to go by, or they were not populated at all. The Harappans established outposts of civilization in areas which were remote, and free from earlier human habitations. There is no unequivocal evidence to indicate that they lived side by side with local cultures or groups of people who had settled in Kutch or Saurashtra prior to their arrival. In all probability, the political control of the Harappans was limited to their settlements, and the small sustaining areas surrounding them.

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PART III

ECOLOGY, TECHNOLOGY AND TRADE

VISHNU-MITTRE and R. SAVITHRI

18. Food Economy of the Harappans

KNOWLEDGE of the Harappan Culture complex has expanded enormously during the last two decades through intensive explorations carried out in the Indian Subcontinent. A fairly large number of new sites has been discovered some of which have widened the geographic expanse of the Harappan Empire far beyond its earlier limits. In spite of this, knowledge of the food economy of this culture complex has not progressed very far. This may be attributed to the lack of carbonized food grains at many of the sites, the rare examination of potsherds and terracotta cakes, the fact that flotation techniques are rarely used, and to the fact that ancient plant remains are frequently not available to archaeobotanists.

There is almost no information on the food economy of the Pre-Harappans (only from Mundigak II, Baluchistan) as compared to that of the Harappans (from Harappa, Mohenjodaro, Chanhudaro, Lothal and Rangpur Period II). In addition there is the recently published information from Kālibangan, Surkotada and Daimabad; however the Banawali food grains remain unexamined. ^{14}C dates for the food grains from Kalibangan and Surkotada would refer them to a Late Harappan Phase.

The presumption that food grains from any level or site of the Harappan Culture suggests the food economy of the entire civilization may well be true; but ought to be supported by evidence. After all, there could have been shifts in the food economy over the course of time at a particular site because of culture contacts or the domestication of wild progenitors. There could also have been different food economies in the various parts of this vast empire, unless it had a uniform climate suited to the cultivation of a particular group of crops. The socio-economic disparities inferred for the Harappans may have, as today, led the elites to exist on superior crops, leaving the poorer classes of the society with inferior foods. There are thus many implications with far reaching significance involved in the study of ancient crops with regard to the life and culture of the Harappans.

Published information on the food economy of the Harappans is available in excavation reports and papers in specialized journals which do not have a wide circulation. In view of the importance of the food economy, and its implications, it is imperative to assemble all the published and unpublished data that is available. An attempt has also been made to procure and re-examine some materials which had been described earlier. This communication is therefore a comprehensive report (within limits of availability of material, of course) on the food economy of the Harappans.

All those colleagues interested in the Harappans are requested to provide, in future, an opportunity for the botanical materials from their sites to be examined. Only this will ensure that a more comprehensive report is prepared. It is unnecessary to ennumerate the advantages that would accrue from such a study, to archaeologists on the one hand, and to agriculturists deeply interested in the history of crops on the other.

This paper is a compilation of the material identified and published earlier by colleagues and by our team. It also includes the results of our reinvestigation of materials from Mohenjodaro and Chanhudaro and a detailed account of the materials from Kalibangan and Surkotada. The Banawali materials examined casually at an exhibition at Purana Qila organized under the auspices of the Archaeological Survey of India are also included. An attempt has been made to arrange the data in chronological order beginning with the Pre-Harappans. The provenance of some of the materials is not given since it could not be obtained.

Usual morphological and statistical methods have been employed in the identification of food remains. Cuticles of plant remains embedded in the terracotta cakes from Kalibangan were extracted and identified by comparison with the cuticular preparations from lemma and palea of modern cereals (Vishnu-Mittre and Savithri 1975). The Kalibangan potsherds with crystals have been found to be devoid of grain or husk impressions, although the crystals have been identified through chemical analysis.

Howsoever inadequate the information is, it still provides a wide-spectrum view of the plant economy of the Harappans which suggests variability in crops grown in various parts of the empire. The analysis of the modern environment, and of the corresponding modern crops, has also yielded very valuable information. In total this information gives us some idea of Harappan cultivation methods, their cropping pattern and the possibility that they used chemicals for the reclamation of the saline/alkaline soils and the like. These topics are discussed in the concluding part of this paper.

THE PRE-HARAPPAN FOOD ECONOMY

Mundigak

Mundigak, Baluchistan
(Casal 1961; Allchin and Allchin 1968; Allchin 1969).

1) Wheat (*Triticum compactum*)
2) Jujube (*Zyzyphus jujuba*)

In the absence of any opportunity to examine these materials and to check the identifications, the following comments have been added which may be of interest.

Modern wheats from cultivated fields in Baluchistan were examined by Howard in 1916. They showed a baffling array of types with a large number of intermediate forms of *T. aestivum, T. sphaerococcum,* etc. He further found that the distinction between *T. compactum* (apparently *T. sphaerococcum*) and *T. vulgare*, based upon glume and grain shape, broke down. It is not known if variability was observed in this Pre-Harappan material and whether it could be *T. sphaerococcum*. Both species possess dwarfing genes at the S and C loci which govern their characteristics.

The *Zyzyphus jujuba* Mill occurring in Sind and Baluchistan is believed to be not truly wild. This is not "ber." *Z. mauritiana* Lam (*Z. jujuba* Lam non Mill) is the real "ber" and it is frequently cultivated and self sown. Wild "ber," the fruits of which are eaten, is *Z. nummularia* (Burn f.) Wt and Arn. It is distributed commonly in the hotter parts of Sind, Baluchistan, etc. (Stewart 1972: 469).

THE HARAPPAN FOOD ECONOMY

Harappa

Harappa, District Montgomery, Pakistan
(Vats 1941: 466–67; Allchin 1969; Vishnu-Mittre 1974a)

1) Wheat (*Triticum compactum* and *T. sphaerococcum*)
2) Barley (*Hordeum vulgare* a small-seeded six-rowed variety)
3) Peas (*Pisum arvense* L.)
4) Sesame (*Sesamum indicum*)

Owing to their nonavailability, these materials could not be examined. For diversity of opinion on the botanical identity of Harappa wheat see "Mohenjodaro and Chanhudaro" in this paper.

The identified wheat came from two lumps: (1) No. 5346A, NDF, Great Granary Area in Square I 9/15, depth five feet, in association with Stratum III, (2) No. 12387 V from a trench on southern edge of Mound AB in association with Stratum II. The barley, No. 3429 came from Extension Pits I and II in Mound AB, depth six feet, in association with Stratum III. The peas, No. 8366 came from the hollow of circular Platform P8 in Trench V. Finally a lump of charred sesame, No. 8827, was found in Trench V, Mound F, depth six feet, in association with Stratum III.

Banawali

Banawali, Haryana, India

1) Wheat

The material was seen at an exhibition as stated earlier; but it was not examined.

Lothal

Lothal, Gujarat, India

(Vishnu-Mittre 1961, 1974a; Allchin and Allchin 1968; Allchin 1969).

1) Rice: imprints of husks and spikelets.

Rangpur

Rangpur, Gujarat, India
(Allchin and Allchin 1968; Vishnu-Mittre 1974a)

1) Rice

We have had no opportunity to examine the rice imprints from Lothal and Rangpur to establish whether they belong to a wild or cultivated form. It was earlier noted (Vishnu-Mittre 1961) that they might belong to wild rice, which occurs locally in marshes; however the possibility of rice cultivation cannot be ruled out.

Mohenjodaro and Chanhudaro

Mohenjodaro, Chanhudaro, Sind, Pakistan

The wheat and barley grains from these two sites, not far from each other, are treated together here.

1) Wheat (Pls. 18.1 and 18.2)

The material examined from Mohenjodaro is from a pavement of late date (Marshall 1931) and subsequently dated by radiocarbon to 1650 B.C. (TF–75, 3600 ± 100 years B.P., Agrawal *et al.* 1964). The sample from Chanhudaro is a mixture of two samples, 2345 and 2346. The Mohenjodaro sample consists of 56 entire caryopses of wheat, with several broken fragments, as well as a fragment of a grain of barley. In contrast, the Chanhudaro material consists of an enormous quantity (several hundred) of wheat caryopses, from which 160 caryopses of barley were segregated.

The divergent opinions on the identity of the carbonized wheat grains from these two sites, and from Harappa, necessitated a re-examination of these materials. Stapf (1931) found the Mohenjodaro wheat grains to be variable in size and shape and referred most of them to *Triticum compactum* but the plumpest ones to *T. sphaerococcum.* On the other hand Percival (1921) referred all of them to *T. sphaerococcum* except those from the SD level which he called *T. compactum.* Luthra (1936) referred them to *T. aestivum* subsp. *vulgare,* and *T. aestivum* subsp. *compactum,* and stated that the *T. compactum* of Mohenjodaro was very similar to that from Harappa (Luthra 1941). Burt (1941) referred the Harappa material to *T. sphaerococcum.* Shaw (1943) examined the Chanhudaro grains that had been preserved in storage bins and referred the rounded and variable grains to *T. sphaerococcum* and the slightly larger ones to the *T. vulgare* type. He also stated that the Harappa and Mohenjodaro wheat grains referred by Luthra to *T. compactum* belonged to *T. sphaerococcum.*

Wheat caryopses of modern *T. sphaerococcum* Perc., *T. compactum* Host and *T. aestivum* L. Syn. *T. vulgare* (Vill.) Host (vide Peterson 1965) were studied by us to prepare a morphostatistical base for the comparative study of the charred grains. The following data are based on 50 or 100 random grains from each species.

Modern Wheat Grains (Table 18.1)

T. compactum Host

The caryopses, about 5–7 by 2–3.5 by 2–3 millimeters have a rounded and broad apex with the base pointed or narrower due to the projection of the embryo. The dorsal surface is flattened and smoothly rounded, and the ventral surface is flat. The ventral furrow running from end to end is deep or superficial.

Table 18.1. Dimensions (in millimeters) of modern wheat grains

No. of grains	Length (L)	Breadth (B)	Thickness (T)
Triticum sphaetococcum			
Humped Grains (with constriction)			
50	Average 5.05	2.81	2.81
Humped Grains (without constriction)			
50	Average 5.16	2.81	2.71
T. compactum			
50	Average 6.02	2.63	2.38
T. aestivum			
50	Average 6.66	2.92	2.76

L=Length, B=Breadth and T=Thickness in millimeters, in all tables.

T. aestivum L.

The caryopses, about 5.75–7.25 by 2–3.75 by 2–3 millimeters, are slightly narrower toward both ends and slightly broader in the middle. The dorsal surface is smooth and slightly raised. The deep ventral furrow is slightly curved, deeper in the middle and running end to end. The furrow margins, far apart towards the tops, converge at the base. The embryo end is less pointed than in *T. compactum*.

The caryopses of both these species are only slightly different in morphological and size characters. This makes a distinction between them in a dispersed condition, uncertain. A similar conclusion has been reached by Jessen and Helbaek (1944) and Helbaek (1958).

T. sphaerococcum Perc.

The caryopses of shot wheat, about 4–6 by 2–3.5 by 2–3.25 millimeters are short, broad and more or less rounded, with or without a characteristic hump (a raised area on the dorsal surface). The hump is either broadly rounded or vertically raised into a narrow projection. The humped caryopses were found on 97 percent of the sample. Of those, 23 percent had a constricted and 65 percent a nonconstricted hump. Grains without a hump were only three percent of the total.

The distinctive morphological features of the caryopses of *T. sphaerococcum* make them distinguishable from those of the other two species. This is further supported by the various index ratios as given in Table 18.2. For instance L/B, and L/T indices are under two, and B/L index above 0.5, etc., for *T. sphaerococcum* against the indices L/B and L/T above two and the B/L index under 0.45 for the other two species.

Table 18.2. Morphology of the caryopses of modern wheat

No. of grains	Species of *Triticum* examined	Index ratios					
		L/B	L/T	B/L	B/T	T/L	T/B
50	*T. sphaerococcum* constricted	1.80	1.80	0.56	1.00	0.56	100
50	*T. sphaerococcum* non-constricted	1.84	1.90	0.54	1.00	0.53	96
100	**T. sphaerococcum*	1.76	1.62	0.56	—	0.61	109
100	**T. aestivum*	2.68	3.07	0.37	—	0.32	87
100	**T. compactum*	2.44	3.07	0.40	—	0.32	79
50	*T. compactum*	2.29	2.52	0.44	1.10	0.39	90
50	*T. aestivum*	2.28	2.41	0.44	1.06	0.41	94

*After Vishnu-Mittre 1974.

The dimensions of the Harappan charred wheat grains, together with their identity, are set out in Tables 18.3 and 18.4.

In applying the identification criteria to the carbonized caryopses on Tables 18.3 and 18.4 (56 caryopses from Mohenjodaro and a random 100 caryopses from Chanhudaro) it can be said that:

Twelve grains from Mohenjodaro, and 30 from Chanhudaro were discovered with a dorsal hump (six constricted at Mohenjodaro and 10 at Chanhudaro) with a L/B ratio much under 2 (ranging from 1.5–1.81).

Nearly twelve grains from Mohenjodaro and 17 from Chanhudaro resembled *T. sphaerococcum* in size and shape, were without hump, but had L/B indices under two.

There were six humped grains from Mohenjodaro and two from Chanhudaro that had L/B indices of two or above, like those of *T. compactum* and *T. aestivum*. These can be considered variable forms.

Thirty-two humpless caryopses with L/B indices of two or more came from Mohenjodaro and 54 from Chanhudaro differed in shape and size from *T. sphaerococcum*. These compared well with the *T. aestivum-compactum* group.

Thus, the Harappans at Mohenjodaro and Chanhudaro were growing and consuming grains of both the *T. sphaerococcum* and *T. aestivum*/*T. compactum* groups.

2) Barley (Pl. 18.3, nos. 1, 3, 4, 7)

For a detailed comparative study of modern barleys and the carbonized specimens see the following section on Kalibangan. Mohenjodaro produced only one broken-hulled grain, whereas from Chanhudaro two hulled (4.3–5 by 2.2 millimeters) and 10 naked (4–5 by 2–3 millimeters) grains of barley were recovered.

3) Rice

There is a report by Andrus and Mohammed (1958) on the occurrence of rice at Harappan sites in Sind and Punjab. We have not been able to trace either the source of this information or the actual specimens.

4) *Pisum arvense*

5) *Brassica juncea*

We did not recover mustard seeds in the material we examined from Chanhudaro.

Kalibangan

Kalibangan, Rajasthan, India

The archaeological provenance of the samples examined is as follows:

Samples

1) KLB-2/XA 17; Locus A17; 8.47×A

Table 18.3. Dimensions (in millimeters) and index ratios of humped carbonized caryopses with L/B ratios under two (*T. sphaerococcum*)

No. of grains	Length (L)	Breadth (B)	Thickness (T)	Index ratio					
				L/B	L/T	B/L	B/T	T/L	T/B
Humped Grains (with constriction)									
Mohenjodaro									
1	4.00	2.25	2.50						
1	4.00	2.50	2.50						
1	4.50	2.50	2.00						
1	4.50	2.50	2.50						
1	4.75	3.00	3.00						
1	5.00	3.00	2.50						
Average	4.46	2.63	2.50	1.70	1.78	0.59	1.05	0.56	0.95
Chanhudaro									
1	4.00	2.75	2.50						
2	4.00	3.00	2.50						
2	4.00	3.00	3.00						
1	4.25	2.50	2.00						
2	4.50	2.75	2.00						
2	5.00	3.00	3.00						
Average	4.32	2.87	2.55	1.50	1.69	0.66	1.12	0.59	0.89
Humped Grains (without constriction)									
Mohenjodaro									
1	4.00	2.50	2.15						
1	4.50	2.50	3.00						
1	5.00	3.00	2.50						
3	5.00	3.00	3.00						
Average	4.75	2.83	2.77	1.68	1.71	0.59	1.02	0.58	0.98
Chanhudaro									
1	4.50	3.00	3.00						
1	5.00	2.75	2.00						
2	5.00	2.75	2.50						
1	5.00	3.00	2.50						
8	5.00	3.00	3.00						
2	5.00	3.50	3.00						
1	5.25	3.00	3.00						
1	5.50	2.75	2.50						
1	5.55	3.00	2.25						
1	5.00	3.00	2.50						
1	5.00	3.00	3.00						
Average	5.04	3.00	2.78	1.65	1.81	0.60	1.08	0.55	0.93
Humpless Grains									
Mohenjodaro									
1	4.00	2.50	2.00						
1	4.50	3.00	2.00						
1	4.50	3.00	3.00						
2	4.75	3.00	2.75						
1	5.00	3.00	2.00						
1	5.00	3.00	2.75						
4	5.00	3.00	2.75						
1	5.15	3.00	2.75						
Average	4.80	2.96	2.58	1.62	1.86	0.62	1.15	0.54	0.87
Chanhudaro									
1	4.50	2.50	2.00						
1	4.75	3.00	2.50						
1	5.00	2.75	2.00						
6	5.00	3.00	2.00						
2	5.00	3.00	3.00						
3	5.00	3.50	2.00						
1	5.00	4.00	3.00						
1	5.50	3.00	3.00						
1	6.00	3.50	3.00						
Average	5.04	3.13	2.32	1.61	2.17	0.62	1.35	0.46	0.74

depth 2.5 meters. Stratum 17 (in three bottles labeled as wheat).

2) KLB-2/XAB; Locus A8, 8.85×A9-5.27, Se. Sector; depth 2.41 meters; Stratum 16 (labeled as gram)

3) KLB-2/XAI; Stratum 25; Depth 4.4 B.B. (brittle charred wood).

4) KLB-1/YAI; Locus YAI; Qdt; I; Depth 1.95 meters, Stratum 3 (labeled as potsherds containing grain and organic material for chemical analysis).

5) KLB-2/Qdr; stratum (terracotta *pai*)

6) KLB-20,566 (terracotta cake).

7) KLB-2/XBI, Stratum 7 (terracotta cake).

The two samples of charred food grains from the early phase of the Harappan Culture dated by radiocarbon to 4040 ± 125 B.P. and 4025 ± 110 B.P. respectively (Agrawal and Kusumgar 1968) were not available for study.

Samples 1, 2, 3, and 5 are from the Harappan Phase whereas sample 4 is from the Pre-Harappan Phase. We are not certain if sample 6 is from the Harappan or the Pre-Harappan occupation. The examination of the two radiocarbon dated samples from the early phase of the Harappan Culture would have thrown light on the food economy of this period, but they were not available for study.

1) Barley (*Hordeum* sp.) (Pl. 18.3, no. 1)

To determine the botanical identity of carbonized

Table 18.4. Dimensions (in millimeters) and index ratios of carbonized caryopses with L/B ratio of two or more
(*T. aestivum, compactum,* etc.)

No. of grains	Length (L)	Breadth (B)	Thickness (T)	Index ratio					
				L/B	L/T	B/L	B/T	T/L	T/B
Humped Grains (without constriction)									
	Mohenjodaro								
2	4.00	2.00	2.00						
1	5.00	2.00	2.00						
1	5.00	2.50	2.50						
1	5.00	2.50	3.00						
1	5.75	2.75	2.75						
Average	4.79	2.29	2.37	2.09	2.02	0.48	0.96	0.49	1.03
	Chanhudaro								
1	4.00	2.00	2.00						
1	6.00	3.00	3.00						
Average	5.00	2.50	2.50	2.0	2.0	0.50	1.0	0.50	1.0
Grains without hump but with both ends blunt, furrow straight with parallel margins									
	Mohenjodaro								
3	4.00	2.00	2.00						
1	4.00	2.00	2.50						
1	4.50	2.00	2.00						
1	5.00	2.00	2.00						
3	5.00	2.50	2.00						
1	5.50	2.25	2.25						
Average	4.60	2.17	2.07	2.12	2.22	0.47	1.04	0.45	0.95
	Chanhudaro								
1	5.00	2.25	2.00						
1	5.00	2.25	3.00						
1	5.00	2.50	2.00						
1	5.50	2.25	2.00						
1	6.00	2.50	2.50						
1	6.00	3.00	2.00						
2	6.00	3.00	3.00						
Average	5.56	2.59	2.43	2.15	2.29	0.46	1.06	0.44	0.94
Grains with both ends tapering, furrow deep, curved, margins wide apart									
	Mohenjodaro								
1	4.00	2.00	2.00						
1	4.25	2.00	1.50						
1	4.25	2.00	2.00						
1	4.50	2.00	2.00						
1	4.50	2.25	2.00						
1	4.75	2.00	1.50						
1	5.00	1.75	1.50						
3	5.00	2.00	2.00						
1	5.00	2.50	2.25						
2	5.00	2.50	2.00						
1	5.25	2.50	2.00						
1	6.00	3.00	2.75						
1	6.00	3.00	3.00						
Average	4.90	2.25	2.03	2.18	2.41	0.46	1.11	0.41	0.90
	Chanhudaro								
1	4.00	2.00	1.50						
1	5.00	2.00	2.50						
2	5.00	2.50	2.25						
3	5.00	2.50	2.00						
1	5.25	2.25	2.00						
2	5.50	2.25	2.00						
1	5.50	2.50	2.00						
1	5.50	2.75	2.50						
3	5.50	2.50	2.00						
2	5.50	2.00	2.00						
2	5.50	2.25	2.00						
1	5.75	2.50	2.50						
1	5.75	2.75	2.50						
5	6.00	2.50	2.00						
1	5.00	2.50	2.00						
1	6.00	2.75	3.00						
1	6.00	3.00	2.50						
12	6.00	3.00	3.00						
1	6.25	3.00	3.00						
2	6.50	3.00	3.00						
Average	5.67	2.62	2.42	2.16	2.34	0.46	1.08	0.42	0.92

barley, the grains of modern barleys belonging to *Hordeum vulgare* L. and *Hordeum spontaneum* Koch were examined for distinguishing criteria. There are approximately eight species of cultivated barley. These are all grouped under *Hordeum vulgare* considered the cultigen embracing all cultivated types. *H. spontaneum* and *H. agriocrithon* Aberg are wild and believed to be the ancestral forms of cultivated barleys (Anonymous 1959: 118).

The *Hordeum vulgare* complex includes various types of cultivated barley, some with six and some with two rows of fertile spikelets (e.g., *Hordeum vulgare* is a six-rowed barley and *H. distichon* Linn a two-rowed barley. *H. spontaneum* is a two-rowed wild barley, as is *H. agriocrithon,* a six-rowed variety).

In the twenty-four cultivated types of Indian barleys five are two-rowed and 19 are six-rowed. The types are further divided into those with husked (adherence of the lemma to caryopsis) or huskless (that is, "naked") grains. Today the six-rowed husked types are the most widely grown in India. The two-rowed varieties, both husked and huskless, are rarely grown.

Modern Cultivated Barley

Exceptionally small barley grains were recovered from the excavations at Kalibangan. Their seemingly aberrant size and the general problems involved with the accurate identification of ancient food grains, demanded a systematic approach to the proper handling of these remains. Therefore, several samples of modern cultivated barley were obtained from the Indian Agricultural Research Institute for comparative study. The results of this investigation are as follows:

1) Hulled barley

Sample RS-17 from Durgapura, Rajasthan. This sample of six-rowed barley had a majority of grains measuring 10–12 millimeters in length, 3.5–4 millimeters in breadth and 2.5–3 millimeters in thickness. Some of the small grains measured 9–9.5 by 2.5–3.25 by 1.5–2.5 millimeters.

Sample BG-1, Punjab. This sample of six-rowed barley ranged in size as follows: 9–12 by 3–4 by 2–2.25 millimeters.

Sample REB-209, India. Unlike the six-rowed hulled grains in the other samples these samples of barley are slender, thin and flat on the dorsal side. They are angular in cross-section, tapering to a narrow base and less sharply to the blunt apex. Their range in size is: 8–11 by 2–2.75 by 1.5 millimeters.

Sample NP-104, I.A.R.I., New Delhi. This six-rowed barley ranged in size from: 7.5–12 by 3–4 by 1.5–2 millimeters.

Sample DG-2, Delhi. The size range of this six-rowed barley is as follows: 8–13 by 2–3 by 1–3 millimeters.

Naked barley

Sample RS-17, Durgapura, Rajasthan. Grains from a packet of naked barley from the hulled barley noted above are quite diverse in size. Their characteristics are as follows:

Size range: 5–9.5 by 2–4 by 1–4 millimeters.

Small grains: 5–6 by 2–3 by 1–2 millimeters.

Medium grains: 5–7 by 2–3 by 1–2 millimeters.

Large grains: 8–9.5 by 3–4 by 2.5–3.5 millimeters.

Sample C-292, Kanpur. This two-rowed barley was: 5–7 by 2–4 by 1–3 millimeters.

Sample HC-1905, Delhi. A naked barley, this sample ranged in size as follows: 6–9 by 2.5–4 by 1.5–2.5 millimeters.

Sample BHD-45 is a six-rowed barley from Delhi. It measured 6.5–9 by 3–4 by 1.5–2 millimeters.

Sample EB-581, New Delhi is a two-rowed sample with the following dimensions: 5–9 by 3–4.5 by 2–3 millimeters.

Samples from I.A.R.I. Two unnumbered samples from this Institute were examined. They were made up of the polished grains of pearl barley. The grains were rounded. Both ends were round, with the ventral groove superficial and broad. The ventral groove was faint or absent. The embryo and hillum scar had been removed by polishing. They ranged in size from: 4–7 by 3–4 by 2.5 millimeters.

DISCUSSION

The study of these modern varieties of barley has revealed that the small grain size was particularly evident in the sample from Durgapura, Rajasthan (RS-17). It should be noted, however, that the number of small grains is less than the combined sample of medium and large grains from the same locality.

The Kalibangan grains are three to five millimeters smaller than the modern grains of barley. This is in part the result of ancient carbonization. Renfrew (1973) observed that modern grains of naked barley, when carbonized in the laboratory, showed a decrease in length and an increase in breadth. But hulled barley shows a very slight decrease in length since the grain is tightly invested by its lemma. Its breadth remains unchanged. But the European prehistoric carbonized grains of barley are two to three millimeters longer than the modern naked examples and one to two millimeters longer than modern carbonized examples. The Kalibangan carbonized grains are thus much smaller, like the very small grains of the variety grown in Rajasthan.

The hulled grain can be easily separated from the naked grain on a morphological basis. When the palea is lost the surface features of grains with faint longitudinal striping allow them to be distinguished from naked grains, which resemble wheat grains, on the basis of macroscopic transverse rippling on the grain surface. The rippling in hulled grains after the palea has been burnt away is coarse and not transverse.

Carbonized Barley Grains

Carbonized barley kernels comprise the bulk of the plant remains in the Kalibangan sample. They were found in three bottles labeled "wheat." The spike parts and paleae are absent. The grains vary considerably in size. The hulled barley grains outnumber naked forms: for every 100 hulled grains, there are only five naked examples.

Hulled Barley Grains

The hulled forms range in size from 2 by 1 by 1 millimeters to 6 by 4 by 3 millimeters (Table 18.5). But most grains are 4 to 5.75 millimeters in length. Although the palea is lost in most of the specimens due to intense carbonization, their angular cross-section is suggestive of its former presence. The grains are characterized by very faint longitudinal striping or finger print-like impressions most likely resulting from the closely adpressed paleae over the grain surface. Such grains are both twisted and straight. The twisted examples are slightly smaller than those that are straight, suggesting derivation from a six-rowed variety which has twisted lateral grains smaller than the median straight ones. The awns and hoods are absent. The absence of any trace of the palea in several other grains makes it almost impossible to decide if these were straight or twisted.

Table 18.5. Dimensions (in millimeters) of hulled barley grains (*Hordeum* spp.) from Kalibangan

No. of grains	L	B	T
1	2.00	1.00	1.00
1	2.75	1.50	1.10
1	3.00	2.00	1.50
1	3.00	2.00	1.10
1	3.25	2.25	2.00
1	3.50	1.25	1.00
1	3.50	1.75	1.00
1	3.50	2.00	1.50
1	3.50	2.50	1.75
1	3.50	2.75	1.75
1	3.50	2.50	2.25
1	3.75	1.75	1.50
1	3.75	2.00	2.00
2	3.75	3.00	2.00
1	4.00	1.00	1.00
2	4.00	1.10	1.00
1	4.00	1.75	1.25
1	4.00	1.75	1.50
1	4.00	1.50	1.50
1	4.00	2.00	1.50
1	4.00	2.00	1.00
1	4.00	2.50	2.50
1	4.00	2.75	2.50
2	4.00	3.00	2.00
1	4.00	3.00	1.75
2	4.00	3.00	2.50
1	4.00	2.50	2.50
1	4.00	2.75	2.50
1	4.00	3.25	2.50
1	4.00	3.50	1.75
1	4.00	3.50	2.50
1	4.00	4.00	3.00
1	4.25	2.50	2.00
2	4.25	3.00	2.00
1	4.25	3.25	2.00
1	4.25	3.50	2.50
1	4.50	2.00	1.50
1	4.50	3.00	2.00
1	4.50	3.50	2.50
1	4.75	2.00	1.00
2	4.75	4.00	3.00
2	5.00	3.00	2.00
5	5.00	3.00	2.50
2	5.00	3.00	3.00
16	5.00	4.00	3.00
1	5.00	3.50	2.50
1	5.00	3.75	3.00
1	5.00	3.00	2.75
4	5.00	4.00	2.75
1	5.00	3.75	2.75
7	5.00	4.00	2.50
1	5.00	4.00	2.00
1	5.00	4.00	3.50
4	6.00	4.00	2.50
4	6.00	4.00	3.00
1	6.00	3.50	3.00
1	6.00	3.00	2.75
1	6.00	3.00	2.50
100 Average	4.59	3.15	2.32

Naked Barley Grains

The few naked barley grains measure 3 by 2 by 1.5 millimeters to 4.75 by 3 by 2.5 millimeters (Table 18.6). Longitudinal furrows and ridges on the surface of caryopses are absent. They are evenly rounded in cross-section and show certain macroscopic transverse rippling on the grain surface. The transverse rippling usually occurs during the drying of the grain resulting from the contraction of the fruit shell devoid of the paleae. The coarse wrinkling seen in carbonized grains when the palea has been burnt away differs from the transverse rippling in naked grains. The former is caused by the fiber cells of the closely adpressed or fused paleae which might have completely burnt away.

Table 18.6. Dimensions (in millimeters) of naked barley from Kalibangan

No. of grains		L	B	T
1		3.00	2.00	1.50
2		4.00	2.75	2.00
1		4.00	3.00	2.00
1		4.25	3.00	2.50
1		4.75	3.00	2.50
6	Average	4.00	2.75	2.08

The barleys cultivated by the Harappans at Kalibangan were varieties which produced hulled barley grains. The naked barley-producing varieties were less common; they were there as revealed by a few naked barley grains. The presence of twisted hulled grains in them reveals that the hulled barley grains were most probably produced by a six-rowed variety.

2) Wheat (*Triticum* sp.)

Among the barley grains, only five rotund or globose grains with a smooth surface (measuring 4–5.5 by 2.75–3.75 by 2–3 millimeters, Table 18.7) were found to possess a distinct dorsal hump as it occurs in grains of *Triticum sphaerococcum*. Unlike wheat caryopses, the ventral furrow is shallow and does not run from end to end, a characteristic seen in grains of barley only. But unlike barley grains, a thin depression or streak running from the embryo to the apex, seen on the dorsal surface, and the projection of the embryo towards the dorsal end, are not seen in these carbonized grains. These grains possess characteristics intermediate between wheat and barley. Their rare occurrence with hundreds of barley grains suggests them to be either aberrant forms or the result of a few wheat plants that may have grown in the barley fields.

Table 18.7. Dimensions (in millimeters) of carbonized wheat grains from Kalibangan

No. of grains		L	B	T
1		4.00	2.75	2.75
1		4.00	3.00	2.00
1		5.00	2.75	2.75
1		5.00	3.75	2.75
1		5.50	3.00	3.00
5	Average	4.70	3.05	2.65

Supporting evidence for the occurrence of wheat at Kalibangan has been obtained from the cuticular anatomy of the husk in terracotta cakes and *pai* from this site. The epidermal characters of rice husk are entirely different and husk referrable to that of rice was not found. Sarma's observation that husk in cakes and *paies* belonged to rice could not be established (Sharma 1972; Vishnu-Mittre and Savithri 1975).

3) *Cicer arietinum* (gram) Chickpea (Pl. 18.3, no. 6)

The three carbonized seeds in sample number 2, measuring 5–7 by 5–6 by 4–6 millimeters (Table 18.8) are squat-shaped, angular and pointed at one end. The blunt oblique point formed by the germ (radicle) is well preserved. The hilum is 1.5–2 millimeters long, large, and concave on the flattened side near the pointed end. The seed coat is also well preserved. The seeds are unmistakably those of the chickpea.

Table 18.8. Dimensions (in millimeters) of gram (*Cicer arietinum*) from Kalibangan

No. of seeds	L	B	T
1	5.00	5.00	4.00
1	6.75	6.00	4.75
1	7.00	6.00	6.00

4) *Pisum arvense*. Linn. (Pl. 18.3, no. 5)

The single seed, about 2.5 millimeters in diameter, from sample number 1, is spherical with an ovate hilum, approximately 0.5 millimeters long, flush with the surface of the seed. It resembles that of *Pisum arvense*.

5) Crystals on potsherds (Pl. 18.3, no. 2)

Sticking to the inner surface of the potsherds in sample number 4, otherwise devoid of imprints of any organic matter (husks or spikelets or grains), was found a large number of transparent to dirty clayey crystals. The chemical analysis of these crystals carried out by Shri D.K. Agrawal, Lecturer in the Chemistry Department of Lucknow University has shown them to belong to selenite gypsum in transparent crystalline form.

Surkotada

Surkotada (Period III), near Adesar, Kutch, India
(Joshi 1972; Vishnu-Mittre 1974a; Vishnu-Mittre and Savithri 1978).

The charred lumps of carbonized seeds in the earthen pot discovered from Locus XA4 (Qd I, Layer 5, depth 1.6 meters) in Period III are dated to 1660 B.C. (TF-1307; Agrawal 1972; Joshi 1972). Period III ranges in time from 1970 B.C. to 1660 B.C. (TF-1297, TF-1294, TF-1311, TF-1307). The advent of a new culture preceded by a widespread conflagration and characterized by the White Painted Black and Red Ware, resembling that of the Ahar Culture in southeastern Rajasthan, is noticeable during Period III. The residual Harappans at this site appear to have been pushed into the background by the influx of new peoples during this period.

Two of the several charred lumps yielded as many as 574 seeds, an overwhelming majority of which were from wild plants. Only about seven percent were identified as being of cereals.

The wild seeds have only been *tentatively* identified for want of modern comparative materials. Their broad, distinctive morphological features allow some of them to be referred to the following groups of wild plants. Their specific identity, wherever mentioned, is tentative.

1) *Setaria* spp. (Pl. 18.4 nos. 1, 2, 3)

On morphological and comparative grounds derived from a study of 10 modern species of *Setaria*, 40 grains out of 574 have been referred to this genus. It is possible that grains of Italian millet (*S. italica*) the cultivated species and the two wild species, the green millet (*S. viridis* and *S. verticillata*) are included (Vishnu-Mittre and Savithri 1978).

2) *Eleusine coracana* (*ragi*) (Pl. 18.4, no. 4)

A small number of grains compare in all essential characters with those of the finger millet (Savithri and Vishnu-Mittre 1979).

3) *Wild Grasses* (Pl. 18.5, no. 8)

Besides *Setaria* spp., dealt with above, there are as many as 257 obovoid, ovoid, oblong and grooved, 1-2 by 0.5-1 millimeters, seeds of grasses. Fifteen of these, the oblong and terete ones, seem to compare with those of *Phragmites karka,* a reed grass. The remaining seeds may belong to wild grasses like *Andropogon, Brachiaria, Panicum, Echinochola, Eragrostis,* or *Digitaria.* These are species which occur as weeds on disturbed soil in and around cultivated fields and settlement sites, or around sheets of water and moist places.

4) *Sedges* (Pl. 18.5, nos. 2, 4, 5)

Among 47 seeds referred to sedges, two globosely obovoid trigonous and rugose seeds, 1.25 by 1.5 millimeters compare with the seeds of *Scirpus supinus.* Thirteen glumeless nuts, which are biconvex, ovate, shortly beaked, stipitate or trigonous, cylindric, ellipsoid, smooth with narrowed apices compare with those of *Carex* spp. and 38 look like those of *Eriophorum* spp.

5) *Cheno-amaranths*

Among 13 seeds, three circular-lenticular examples with curved embryos compare with those of *Amaranthus* spp. and eight ornamented specimens with those of *Atriplex* spp. probably *griffithii* Moq. var. *stocksii* Boiss, a plant of salt marshes.

6) *Polygonum* spp. (Pl. 18.5, no. 7).

Two hundred and fifteen triangular, ovate, lens-shaped seeds, about 1-1.5 millimeters long seem to belong to this genus on morphological grounds.

7) *Euphorbia* spp. (Pl. 18.5, no. 3)

Twelve obtusely four-angled seeds about one millimeter across compare with those of *Euphorbia pycnostegia* as described by Hooker (1885) in the *Flora of British India.*

THE FOOD ECONOMY OF THE LATE HARAPPANS

Daimabad

Daimabad, District Ahmednagar, Maharashtra
(Deshpande 1978)*

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*Editor's note: See also S.A. Sali's paper in this volume.

The Savalda Culture inhabitants of Daimabad had a food economy consisting of the following plants:

Jowar (*Sorghum* sp.)
Barley (*Hordeum* sp.)
Lentil (*Lens culinaris*)

Period II on the site produced only barley (*Hordeum* sp.)

Period III, following Period II, a barren and weathered deposit ceramically corresponding to Period I at Prakash (ca. 1500 B.C.), had a food economy consisting of:

Barley (*Hordeum* sp.)
Pea (*Pisum* sp.)
Horsegram
Lentil (*Lens culinaris*)
Mung (*Vigna radiatus*)
Indian jujube (*Zyzyphus* sp.)

(Possible latin names are added by us.)

Daulatpur

Daulatpur, District Kurukshetra, Haryana

1) *Vigna mungo* (L.) Hepper (*Phaseolus mungo* L), Urd.

Charred grains from Locus 01, Stratum (5), depth 1.65 meters, referred to Late Harappans, have been identified by us as *Vigna mungo,* Urd.

CONCLUSION

Factual information on the remains of food plants is so scanty and widely scattered that it allows neither the reconstruction of the sequential development of the food economy from the Pre-Harappan to the Late Harappan nor does it provide information on the changing food economy at a particular site through the passage of time and through phases of evolution and devolution of the Harappan Culture.

It has become apparent, howsoever insufficient the evidence is, that in themselves the food grains from Harappan sites could have provided the Harappans with a balanced vegetarian diet: carbohydrates derived from cereals like wheat, barley, millets, etc., proteins from peas, chickpea, *Vigna* and horsegram, and fats from seeds of sesame and mustard. They were also consuming the fruits of jujube. One believes that there were probably other food plants as well, but certain evidence is lacking.

GEOGRAPHICAL VARIABILITY OF CROPS

The presence of wheat at Mundigak, predominantly wheat, with some barley, at Mohenjodaro, Chanhudaro and Harappa, wheat at Banawali, exclusively barley at Kalibangan, the millets *Setaria* and *Eleusine* at Surkotada, and possibly rice at Rangpur and Lothal would suggest that the food economy in the vast Harappan Empire was not a uniform feature; rather, it varied geographically. We cannot overlook, however, the fact that complete information on their food economy still escapes us. But, broadly speaking, the Harappan situation compares well with the modern food economy in western South Asia. This vast region is presently characterized by a variety of climates from arid to subhumid, with gradation both in temperature and precipitation. There is a variety of soils as well. The Harappan crops suggest that a similar situation existed during those times. It is unlikely that the vast region was uniformly wet or dry as is usually believed.

The crops presently cultivated in Baluchistan, Sind and the Punjab (Stewart 1972) are:

Triticum sphaerococcum. Formerly grown in Sind and the Punjab, but now only important in Baluchistan.

Triticum aestivum, durum and *trugidum; Hordeum distichon,* and *vulgare* are now grown extensively in Sind and the Punjab.

Italian millet (*Setaria italica*) and *bajra* (*Pennisetum typhoides*) are the important millets in parts of Baluchistan.

Paspalum scrobiculatum is important in Sind.

Several varieties of *jowar* (*Sorghum bicolor*) are important in Sind and lower Baluchistan.

Panicum miliaceum (Cheena) and *P. sumatrense* (*miliare* Lamk.) are also found, the latter especially in Sind.

Eleusine coracana is found occasionally on the plains and the lower hills of the Indus delta.

On the Indian side, in the Punjab, Haryana and western Uttar Pradesh, wheat is the predominant crop, grown along with *bajra* and barley. Rice is comparatively unimportant in these regions. *Bajra* is the principal crop in the Rajasthan desert along with *jowar* and barley. Maize, introduced in the historical period is also cultivated. A drawing on a Mohenjodaro potsherd (Marshall 1931 Pl. LXXXVII, photo 5) looks like a *Sorghum* plant and indicates that more crops, particularly millets, may have been grown by the Harappans than we know so far.

ENVIRONMENTAL ANALYSIS OF CROPS

The inferred geographical variability of Harappan crops, if factual, should indicate environmental variability during the Harappan times. The environmental analysis of the comparable modern crops discovered from the Harappan Empire should make this point.

Wheats

Although largely restricted to an area with annual precipitation between 37 and 110 centimeters, a little wheat is grown in regions with less than 22.5 centimeters of rainfall. The rain should be well distributed during the year. Irrigation is essential in desert soils. River alluvium is poor in nitrogen, humus and phosphorus as compared to Indus alluvium which is loamy or sandy loam, alkaline and rich in phosphorus and potash but poor in organic matter and nitrogen. Alluvium yields a good wheat crop, with or without irrigation. Water is a great limiting factor for agriculture in the Rajasthan desert, southern Punjab and Haryana, although the soils are alkaline with high percentage of soluble salts (Anonymous 1976).

According to Rao (1974: 37) many local wheats are tolerant of adverse soil conditions. Also being drought tolerant they are grown in areas of low soil fertility with little precipitation. *Triticum sphaerococcum* particularly, is highly resistant to drought, which explains its former widespread cultivation in northwestern India (Singh 1946). It requires a cool climate at the time of sowing but sufficient warmth devoid of high humidity at the time of grain formation. Desiccating hot winds affect its growth adversely.

Barley

Being both heat and drought resistant, barley is grown in areas too dry or too saline to carry a satisfactory wheat crop. It is the most profitable crop where saline or alkaline conditions prevail (Bakshi and Ranga 1974: 48-49). It requires moderate precipitation and sunny weather. It is tolerant of alkalinity, frost and drought and is less exacting in its nutritive requirements than wheat. It is also grown without manuring. Barley is grown with wheat in the Punjab and Uttar Pradesh as an insurance against weather hazards. It is also grown mixed with gram.

Owing to barley's higher digestibility coefficient, it is regarded as inferior for human consumption. Because of little or no glutin, its flour is mixed with that of wheat to make bread (*chapatties*) (Anonymous 1959).

Sesame

An essential article in Hindu religious ceremonies, this seed requires a warm climate and cannot withstand frost, continued heavy rains or prolonged drought. Waterlogging is highly detrimental to sesame which thrives best on sandy loams like the sandy semidesert soils in Rajasthan, or clayey soils or on black cotton soils of Central India. It is a rotation crop with wheat, gram, cotton, *ragi, jowar,* etc. It is also grown mixed with *bajra, jowar,* cotton, etc., as a measure against total loss. Manuring is done in the mixed cropping pattern (Anonymous 1972).

Setaria italica

This is a crop suited to tracts with low rainfall (50-75 centimeters) which is uncertain both in quantity and distribution. The least touch of frost is fatal to it. Italian millet favors ordinary red loams but also grows on very light ashy soils and black cotton soil. Cultivators grow it alone, or mixed with cotton, *ragi, Dolichos lablab* or in rotation with *Sorghum* and *Pennisetum typhoides.* Manure is seldom applied unless it is under irrigation. But for hoeing or working the crop with a blade harrow no further attention is given. The grain is also used for cage birds. *Setaria glauca* is cultivated on light soils with moderate rainfall without manuring or irrigation (Anonymous 1972).

Eleusine coracana

Much like *Setaria;* but grown in areas with under 625 millimeters of rainfall, irrigation becomes essential. It stands salinity better than any other crop.

Rice

Usually suited to regions where rainfall is adequate it can be grown in tracts with rainfall below 200 millimeters, provided it is compensated with adequate supply of water. Waterlogged conditions are most suitable.

This concise environmental analysis, along with the discussion of crops still grown in Baluchistan, Sind, Punjab, etc., where extremely low rainfall, drought and adverse soil conditions still prevail, makes interesting reading. Water is a great limiting factor in these regions and some sort of irrigation must be practiced. The proximity of river alluvium, if exploited for cultivation, should offset this limiting factor. For the Harappans, exploiting flood plains along the rivers for cultivation water was indeed not a great limiting factor. There is, thus, reason to believe that the precipitation pattern during Harappan times was much like the present, and irrigation, mostly natural, was used along the lines of the present day farming practice in Sind, as described by Lambrick (1967).

The fact that only barley was found at Kalibangan suggests that the environment here was harsher, with saline alkaline soils unsuitable for wheat cultivation. The presence of the most drought-resistant wheat (*Triticum sphaerococcum*) in the rest of the Harappan Empire also suggests the prevalence of drought conditions during Harappan times.

The cultivation of *Setaria* and *Eleusine,* a small fraction of thousands of wild seeds gathered by the Late or Post-Harappans at Surkotada, may be ruled out. These were perhaps cultivated elsewhere in Gujarat, as today.

From the above analysis it appears that environmental variability, much as is seen today, also existed in Harappan times.

STATUS OF RICE IN HARAPPAN FOOD ECONOMY

The Harappans were generally unaware of rice as a crop, except possibly in Gujarat (Lothal and Rangpur) where there is meager evidence for husks in the form of imprints in pottery (wild or cultivated, it is not known). If it was cultivated, the supply of water required for its cultivation may have been derived either from higher rainfall or from rivers and streams in the vicinity. About 150 years ago, under what is essentially the present precipitation pattern, rice, yielding a good revenue, was cultivated in the territory between Lakhpat, Sahera and Mundhan. This was possible because of a sufficient fresh water supply coming through a channel from an affluent of the Indus. Why could not the Harappans at Rangpur and Lothal have done something similar? After all, the territory of Lakhpat is a desert today and no rice has been grown here since 1762 when a bund was constructed at Mora by the ruler of Sind. This diverted the Indus water into his territory (Raverty 1892; Oldham 1926). Considerable quantities of rice were also grown in and near fertile areas of Bikaner (Todd 1832). Thus, if the water requirement is met, rice can be successfully grown, even if precipitation is much lower than required. Still, evidence suggests that the Harappans, over a large part of their empire, were not aware of this crop.

METHODS OF CULTIVATION

There is one example of field preparation through furrowing at Kalibangan (Lal 1971). This does not, however, allow us to generalize that this was a uniform practice over the entire Harappan Empire.

The contemporary observations by Lambrick (1967) that wheat and barley, the principal food grains on the flood plains of the Indus, are cultivated without ploughing, manuring or providing additional water, may be the manner by which the Harappans grew these crops. Fields may also have been surrounded by earth embankments, possibly along the banks of natural flood channels. The natural fertility of the alluvium was exploited together with the annual inundation, just as is done today. This is supported by the absence of tools used for agriculture in the Harappan sites. There is no factual evidence for either a rake or a harrow; although Kosambi believed the latter to have been used (Allchin and Allchin 1968: 260).

In this connection it is interesting to note that eight years of research and experiments at the Punjab Agricultural University, Ludhiana, have recently shown that tilling the land is not essential for the germination and growth of crops like wheat and maize. They have also found that tilling is required only for weed control (*Hindustan Times* May 1, 1979: Union Agricultural Minister Mr. M.S. Barnala's statement in the Lok Sabha, PTI news, April 30, 1979). To achieve this minimum tilling a bullock-drawn till planter has been developed by this university to shear off the soil crust and stubbles, open a furrow, sow the seeds and apply fertilizer in a single run. The bullock cart was known to the Harappans. Perhaps they used it for minimum tilling.

THE USE OF CHEMICAL FERTILIZER

The discovery of gypsum crystals on a potsherd from the Harappan site of Kalibangan is of special interest. The reason that the Kalibangan Harappans gathered gypsum and stored it may be explained through the present day use of this material to reclaim saline lands and render them productive.

Gypsum occurs profusely in the Rajasthan desert. There is also a large number of deposits in Bikaner. Ground gypsum is used in agriculture as a surface plaster for conserving moisture in the soil and for aiding nitrogen absorption from manures. It is also used to reduce the salinity and alkalinity of soils where the sodium ion is replaced by a calcium ion, since gypsum is calcium sulphate ($Ca\,SO_4 2H_2O$). The soils of the Rajasthan desert are usually saline and alkaline. Even the water is saline, with sodium forming 90 percent of the total cations (Raychaudhuri 1964).

In view of this, the possibility that the Harappans in northern Rajasthan used gypsum as a fertilizer becomes all the more plausible.

CROPPING PATTERN

We continue to be unaware of the cropping pattern and the rotation practices of the Harappans. However, the Kalibangan furrowed field suggests mixed cropping. The same may perhaps be suggested by the mixture of wheat and barley, gram and other grains in the samples from Mohenjodaro and Chanhudaro. There is a small proportion of barley in the Mohenjodaro material; but the proportion is about 20 percent in the Chanhudaro sample. The mixed cropping of cereals, like wheat and barley, is practiced even today in the Punjab, Haryana and Uttar Pradesh as an insurance against weather hazards so that if wheat fails to ripen, the hardier barley is sure to yield.

Further, the occurrence of grains of both wheat and barley in the granaries suggests that bread was made from a mixture of both since barley flour alone has little or no glutin and is highly unsuitable for the purpose. Alcoholic drinks may also have been prepared. The dish-on-stand was perhaps used for this purpose.

HARAPPANS: THE FOOD GATHERERS

The new people that arrived at Surkotada when the residual Harappans had been pushed to the background, and the site had been affected by a widespread conflagration, seem to have been food gatherers, as the evidence of thousands of seeds of wild plants would suggest. Characterized by the White Painted Black and Red Ware, these peoples, it is believed, show resemblance with the Ahar Culture (Sankalia 1974). There is, however, scanty evidence of cultigens such as Italian millet and finger millet (*ragi*). The object for collecting such a wide variety of seeds of grasses, sedges, *Polygonum* and other weeds is enigmatic. Were they all used to prepare a gruel, or medicines, or were they gathered to feed cage birds? These questions will remain unanswered until more evidence has been obtained.

IMPACT OF HARAPPAN FOOD ECONOMY ON CONTEMPORARY CULTURES

The Neolithic cultures in Kashmir and Bihar (Chirand dating from 1700 B.C.) and the OCP Ware Culture in western Uttar Pradesh, Punjab, Haryana and northern Rajasthan (Bharatpur) and the Copper Hoard Cultures were all contemporary to and coexisted with the Harappans of north and northwest India. Their chronology is established to either the entire span of the Harappan Civilization, or to the Mid and Late Phases, by ^{14}C and thermoluminiscent dates (Gaur 1973). Recent researches in the Sarasvati and Drishadvati Valleys in Haryana (Suraj Bhan 1973) and Punjab (Deshpande 1978) have brought out the existence of Harappans in the vicinity of the OCP Ware sites. The cultural interrelationship between the two has also been established. This is a region where the annual precipitation ranges from 600 to around 1000 millimeters. The information on the food economy of most of the OCP sites is unknown, except from Atranjikhera (Chaudhury *et al.* 1971) and Bharatpur (materials we examined). A comparable Neolithic food economy is known from Chirand in Bihar (Vishnu-Mittre 1974b), while the Neolithic Burzahomians were food gatherers (Vishnu-Mittre and Savithri in press).

Howsoever insufficient the information on the food economy of the OCP culture is, it included rice, barley and gram at Atranjikhera. Rice, wheat, barley, *Pisum*, etc., are known from the Neolithic food economy at Chirand. Of these wheat, barley, gram and *Pisum* are common to the food economy of the Harappans.

The most ancient records of wheat, barley, gram and *Pisum* are known from western Asia and southern Europe (Greece). Their earliest occurrence in the Indian Subcontinent and Afghanistan predates the OCP Ware Culture. The introduction and spread of these crops beyond the borders of the Harappan Empire should indeed be attributed to the Harappans.

Whether the Harappans acquired these crops from western Asia, or they were domesticated in northwestern India by the cultures preceding the Harappans, is a matter that remains to be settled. The recent archaeobotanical discoveries in Greece have shown that the region for domestication of wheat and barley extended far beyond the Fertile Crescent. It is interesting to note that northwest India is included by cytogeneticists (Darlington and Janaki Ammal 1945) in the vast center in which wheat and barley are believed to have been domesticated. Deeper digging and boring in this region are sure to provide important information in this matter.

Rice is a crop for which the oldest records (both wild and cultivated: Vishnu-Mittre 1978) are now available from the Neolithic of Koldihwa dated by radiocarbon to 7000 years B.P. It was obviously then diffused to the east and west, through North India, and via eastern Rajasthan into Maharashtra and the deep South (Vishnu-Mittre 1978). The Harappans who came in contact with the OCP Ware peoples, or the Neolithic peoples of North India, influenced the latter food economies with wheat and barley, but did not take advantage of rice. The evidence at the present stage suggests that the Harappans did not introduce this crop into their own empire. It can be hoped that the examination of pottery from all the known Harappan sites, and from fresh excavations, will soon throw more light on these observations.

Today, wheat and barley are predominantly cultivated along with *bajra, Sorghum* and gram in the region formerly occupied by the OCP Ware Cultures. Rice is grown comparatively less. A comprehensive examination of pottery and carbonized materials is certain to bring out more information on the Harappan food economy. This information will take us a long way toward a clear understanding of the various aspects of the food economy discussed here.

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D.P. AGRAWAL and R.K. SOOD

19. Ecological Factors and the Harappan Civilization

INTRODUCTION

THE Harappan Civilization was spread over a 1.3 million square kilometer area of Pakistan and western India. This area itself has considerable variation in rainfall—from five to sixty centimeters per year—yet, on the whole, the entire area is either arid or semiarid.

There has been considerable debate regarding the degree and extent of climatic change within the zone of the Harappan Civilization. We will briefly review some of the old theories on this matter. Some note will then be taken of the new data on climatic change and paleochannel configurations in Rajasthan and Gujarat. Finally, some direct archaeological implications of the ecological evidence will be considered.

PREVIOUS THEORIES

The older theories of Stein (1937), Marshall (1931), Wheeler (1959) and Piggott (1950) suggested wetter conditions during the Harappan times. These have been critically evaluated elsewhere (Agrawal 1971). On the basis of the extensive remains of *gabarbands* (dams) and human settlements in the Mashkai-Jhalawan area, Stein (1937) inferred more favorable climatic conditions. Piggott also said, "...the inference from the fauna, the wood needed to burn so many million bricks, and the implication of a flourishing agricultural background, all suggest a climate different than today. " (Piggott 1950). Wheeler (1959) emphasized that "broad jungles and intermittent marshes were indeed infested with elephant, tiger, buffalo, rhinoceros and crocodile, familiar to us from their exquisite representations on the Indus seals."

But these arguments did not convince scholars like Fairservis (1967) who pointed out that the three main trees (*Acacia arabica, Tamario gallica* and *Prosopis spicigera*) provide an adequate supply of local fuel today and probably did so also during Harappan times. Raikes and Dyson (1961) calculated that only 400 acres of gallery forest would be needed for each rebuilding of Mohenjodaro. Chowdhury and Ghosh (1951) examined the plant remains from Harappa and declared that "these wood remains do not support the theory that a moist tropical forest prevailed in the neighborhood of Harappa." Regarding the faunal evidence, Fairservis (1967) suggested that the Harappan fauna was without exception dependent upon grassland and open forest country. Discussing the *Rhinoceros unicornis* remains from Kalibangan, Banerjee and Chakrabarti (1973) mention the occurrence of the rhino in the Punjab during Mughal times. Recently, Thapar (1977) has cited evidence for the use of unburnt bricks and the occurrence of barley from Kalibangan as proof of a dry climate during the Harappan and Pre-Harappan Periods.

It is obvious from the above that the data which has been available can be used to support both interpretations: for and against climatic change. We will now discuss some evidence on the climatic change which has come to light as well as information on other events leading to drainage changes. Both these points have an ecological significance and have resulted from our recent research.

CLIMATICALLY CONTROLLED ECOLOGICAL FACTORS

Climatic change is a global phenomenon, and due to fears that the entire earth may be entering another Ice Age, many national governments have appointed special commissions to urgently report on the climatic change. Several reports from these scientific committees, appointed by their National Academies, are now available. Those from Australia, Canada and the U.S.A provide especially excellent summaries on this recent paleoclimatic research (Beltzner 1976; National Academy of Science 1975).

Recent research has established beyond any doubt that climate has been continuously changing (Lamb 1977). Even during the last 5000 years significant changes have taken place. For example, there is now clear evidence for glacier expansions between ca. 1000 and ca. 3000 B.C., as well as during the well-known Little Ice Age (Fig. 19.1). Glacier expansions are generally associated with aridity in non-glaciated areas. "The warmest episode in the mid-continent occurred approximately 8000 to 9000 B.P. with evidence of cooling as early as 5500 to 5000 B.P." (Beltzner 1976: 23). Similarly, the report of the National Academy of Sciences of the United States says: "The period from 7000 to 5000 years ago was marked by temperatures warmer than those that prevail today. The last 5000 years is characterized by generally declining temperatures and a trend towards more extensive mountain glaciation (but not ice sheets) in all parts of the world" (National Academy of Science 1975: 132). Similar is the trend of air temperatures at ca. 5500 B.P. as reported by the Australian Academy of Sciences (Australian Academy of Science 1976: 18). Similar climatic data are available for the western and southern hemispheres, but no detailed information is yet available from the tropical areas. It appears though that there is some time lag between the western and eastern hemispheres. The Australian data (Australian Academy of Science 1976) indicate 2000-year cycles of cooling alternating with warm periods (Fig. 19.2) from 6000 B.P. to recent times. The Harappan zone could not have been immune to such global climatic changes and, in fact it was not.

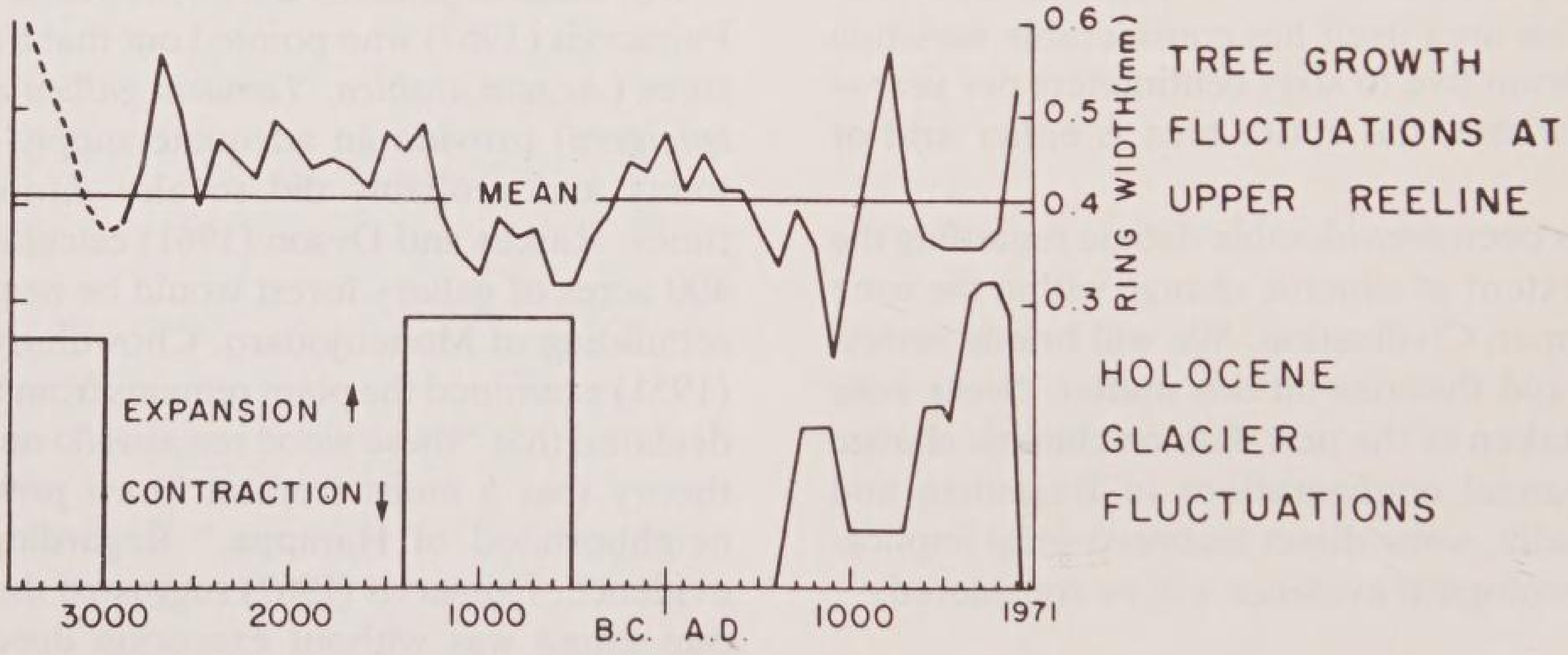
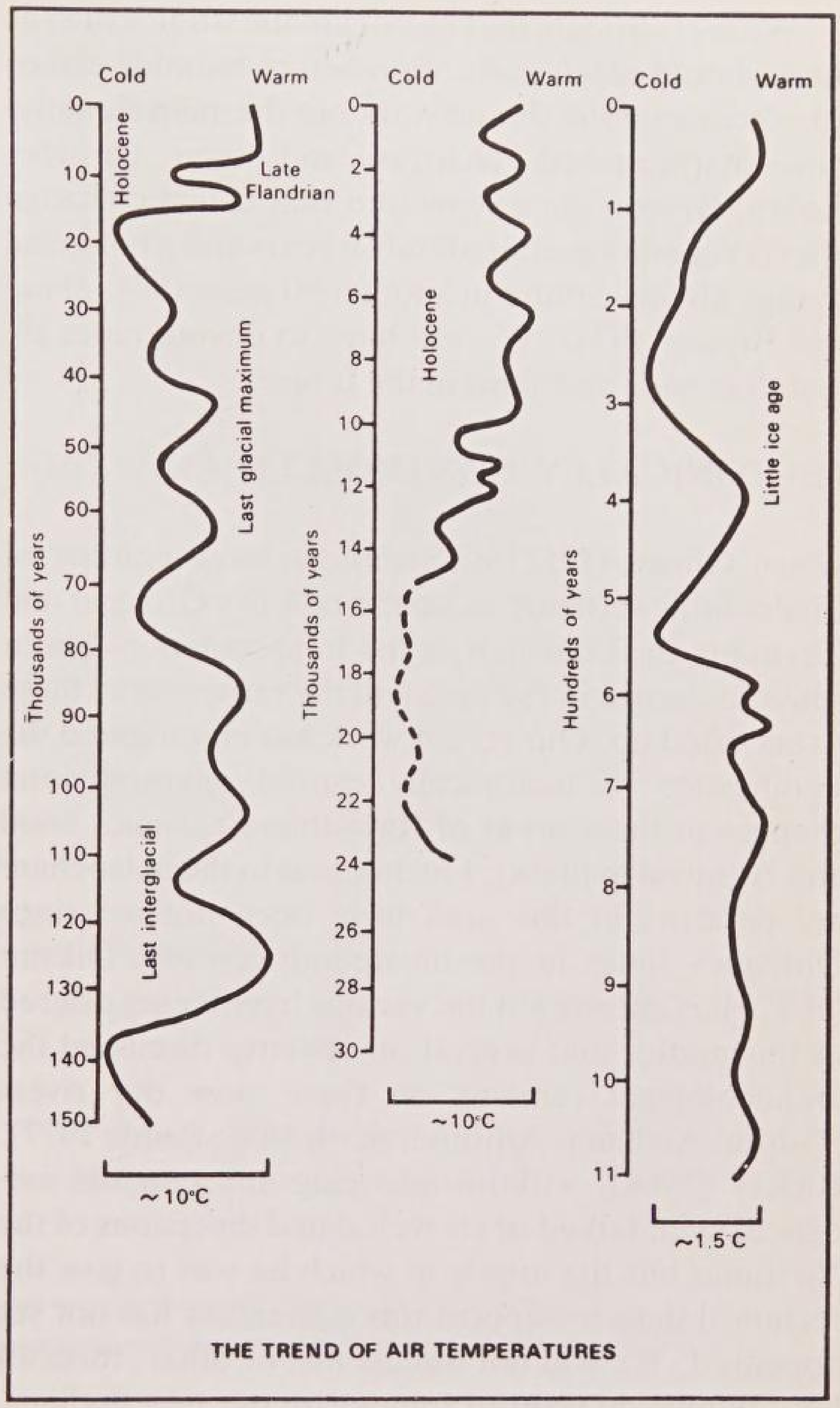


Fig. 19.1. Climatic record of the past 5000 years. The upper curve represents 100-year mean tree ring widths of bristle cone pine at the upper tree line in the White Mountains of California. Positive growth departures indicate warm season temperatures above the long-term mean (after LaMarche). The lower curves represent advance and retreat of Holocene Alaskan Glaciers (National Academy of Science, 1975).

At the moment the best, most substantial paleoclimatic evidence comes from Rajasthan. Singh, working on the sediments of the northern salt lakes of Rajasthan (Lunkaransar, Didwana and Sambar) has shown significant fluctuations in precipitation based on the pollen sequences dated by radiocarbon (Singh *et al.*, 1974). He has indicated that except for the Pre-Holocene aridity, from 10,000 B.P. to about 3500 B.P., Rajasthan was generally wetter than today. Between 5000 and 3500 B.P., a markedly wet period was followed by a severe aridity between 3000 and 2000 B.P. After 2000 B.P., according to Singh, the climate acquired its present character.

Semiarid regions are ideal for observing geomorphological manifestations of climatic change. In Rajasthan, an interplay of fluvial and aeolian processes is determined by the precipitation changes. During wetter periods, river and stream channels revived and dunes stabilized. As Verstappan (1970: 104) has pointed out, sand dunes tend to stabilize wherever rainfall exceeds 250 millimeters per year. This postulate was utilized by Allchin, Hegde and Goudie (1972: 451) in their paleogeographic work in the area. They tried to correlate different relict land surfaces with different climatic episodes. They further suggested that microlith-using groups in Rajasthan had inhabited stabilized dunes. Misra has, however, reported microliths in excavated context from the body of dunes (Misra 1977: 31). During the last few years we have carried out an extensive multidisciplinary survey of Rajasthan in collaboration with Poona University and Central Arid Zone Research Institute, Jodhpur. This team has been able to identify various signs of climatic change during the Late Quaternary in Rajasthan. These have been dated by the ^{14}C technique. Calcrete samples from the surfaces of the stabilized dunes near the Pushkar area were collected. These were dated to ca. 5000-6000 B.P., (Agrawal *et al.* in press a, b). The calcrete formation can be taken as the time of dune stabilization, that is a period when more moisture was available. After this phase, there is evidence for fresh dune activity, which, for lack of proper samples, has not been adequately dated. Climatic change is also evidenced from the sedimentation changes in Malhar Rann, as indicated by sedimentological analysis (Agrawal *et al.* in press a, b). Shallow profiles of the aggraded planes have shown almost regular oscillation between sandy silt and *kankarized* sediments. Scanning electron microscopy of quartz grains from these sediments indicates the possibility of aeolian and fluvial conditions alternating with each other (Agrawal *et al.* in press a, b). In Nagar District there are now no perennial rivers; but we have discovered sizable relict river beds which were occupied by Early and Middle Paleolithic man.

In summary, we have been able to work out the broad climatic oscillations in Rajasthan for the Late Quaternary Period. But for the finer oscillations in the Holocene much more data, drawn from multiple sources are being processed, and we hope to give a more definitive picture fairly soon. Even at this early date, however, we have several lines of evidence which indicate that at ca. 5000 B.P., the climate was wetter than before in Rajasthan. The onset of aridity can possibly be placed about 3500 B.P.



THE TREND OF AIR TEMPERATURES

Fig. 19.2. Behavior of air temperature fluctuations during the last 150,000 years. The two right hand curves give detailed fluctuations during the last 30,000 years and 1,100 years respectively (Australian Academy of Science, 1976).

In semiarid regions where the ecology hangs on a precarious balance, even minor shifts of climate could spell disaster. There is a clear indication of increasing aridity by the middle of the second millennium B.C. which must have put the Harappan Civilization under great stress. In addition to this, there could of course have been other factors: an increase in salinity, a rise of the water table, frequent floods, invasions, etc., especially in the nuclear regions, which may have been responsible for the final collapse of the Harappans.

We feel strongly that paleoclimatic studies such as these should receive attention before building elaborate theories. One should work out the main climatic-cum-environmental changes and then consider theory. Bryson once suggested that climatic change affects vegetation after about 50 years and a botanical change affects culture in another 50 years (Wendland and Bryson 1974). We will have to devote more research to such problems in the future.

TECTONICALLY CONTROLLED CHANGE

When Ghosh (1952) discovered a large number of Chalcolithic settlements on the now dry Ghaggar and Chautang in Rajasthan, it led to speculations about climatic change in the area and the reasons why these rivers dried up. Our recent work has investigated the significance of tectonically caused environmental changes in these areas of Rajasthan (Yashpal, Sood and Agrawal in press). Fluctuations in the paleochannel patterns in this area have been noticed since Oldham's times in the nineteenth century. Dikshit (1977) has chronicled the various hypotheses offered in this matter and several others have discussed the archaeological remains on these now dry rivers (Gupta, Asthana, Amrendranath 1977; Pande 1977). Raikes (1968), without adducing any tangible evidence, even talked of six well-dated diversions of the Yamuna; but the article in which he was to give the technical data to support this contention has not yet appeared. We will not discuss his, or other, theories here but we do want to summarize our new findings, based on Landsat imagery and the field data of other workers. A detailed paper is appearing elsewhere (Yashpal *et al.* in press); we report only our conclusions here.

The Satluj (Sutlej) once flowed into the Ghaggar following a path east of Ropar (Rupar), Sirhing, Patiala and Shatrana (Fig. 19.3). The Ghaggar was a mighty river in the past and had on an average a bed eight kilometers wide. The Satluj, before assuming its present course, was braided into a multitude of channels. This fact is also recorded in the *Mahabharata* in the form of a legend: when Vashishta threw himself into the Satudri (Satluj) it broke into a hundred streams. Since enechelon faults controlled the river course of the Ghaggar, it was prone to drastic changes caused by even minor tectonic movements. The contention that the Satluj once flowed into the Ghaggar is supported by both our work with Landsat imagery and the ground-based field work done by Singh and Ghose (1977).

There was once another major river to the east of the Ghaggar which was frequently changing its course. Three of these courses have been traced, Y1, Y2 and Y3 (Fig. 19.4). The Y1 channel was connected to the Ghaggar. Later it followed the Y2 course merging with the Chautang, which later met the Ghaggar near Suratgarh. The third course (Y3) flowed further east and southeast, finally joining the Ganges, probably through the Chambal. When this Y3 river shifted further east, it left the various lakes in its course which now lie north of Bharatpur (Fig. 19.4). It is probable that it was the Y3 river which eventually took the course of the Yamuna.

These changes in the courses of the various paleochannels are fairly clear, and are supported by published field data. The terminal course of the Ghaggar is, however, far from clear. Near Anupgarh, the ancient Ghaggar bed bifurcates and both the paleochannels come to an abrupt end. The upper one terminates near Marot. The lower one ends as a shallow depression near Beriwala in Pakistan. On the Landsat imagery the lower course looks as if it debouched into the sea, but obviously it was unlikely that the sea was so far inland in Mid-Holocene. It is possible, however, that the chain of tectonic events which diverted the Satluj and the easterly rivers away from the Ghaggar, caused a depression into which the Ghaggar, deprived of its major source of water, died into a lake-like depression.

When the Ghaggar was a perennial river, it is possible that it could have met the eastern Nara and flowed directly into the Rann of Kutch, without meeting the Indus. The paleochannels beyond Marot indicate such a possibility, and it is supported by legend which says that the Sarasvati flowed directly into the sea (Indras 1967).

The presence of archaeological sites in the vicinity of these paleochannels makes it possible to date their active, wet periods. Research by Ghosh (1952), Suraj Bhan (1973), Dikshit (1977: 61), Gupta, Asthana and Amrendranath (1977: 79) and Pande (1977: 55) has already given the outline of this chronology, although much more work needs to be done on this problem. As we understand it now the Ghaggar was alive during the Pre-Harappan and Harappan periods. But, by the Painted Gray Ware (PGW) times it must have been dry, or nearly so, since sites of this period are found within the entrenched river bed. The

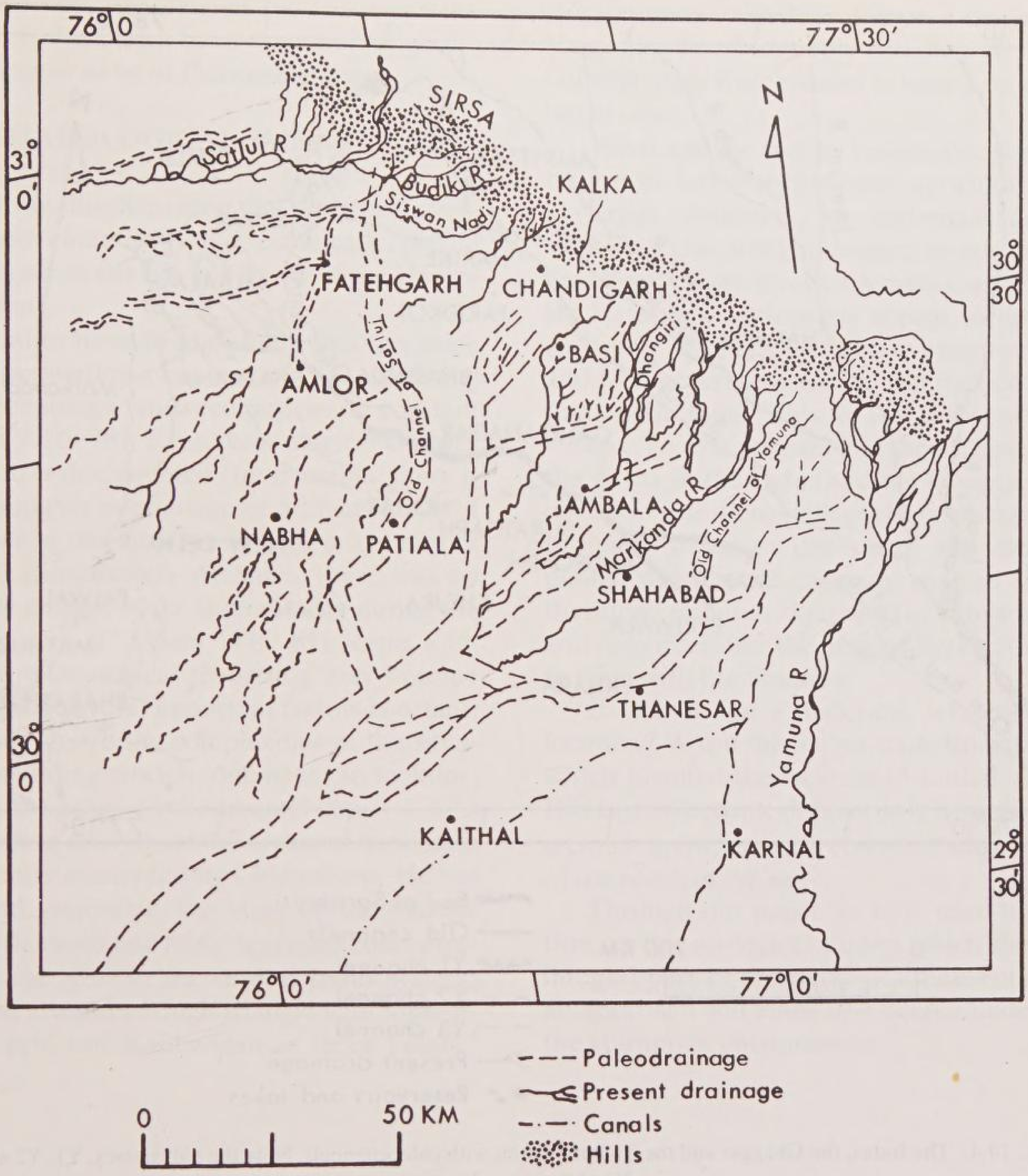

76°0
77°30'
SIRSA
Satluj R
Budiki R
Siswan Nadi
KALKA
N
31° 0'
30° 30'
FATEHGARH
CHANDIGARH
BASI
Dhangiri
AMLOR
Sirsa
Old Channel
AMBALA
Markanda R
Old Channel of Yamuna
NABHA
PATIALA
SHAHABAD
THANESAR
Yamuna R
30° 0
KAITHAL
KARNAL
29° 30'
76°0'
77°0'
0
50 KM
Paleodrainage
Present drainage
Canals
Hills

Fig. 19.3. The Indo-Gangetic Divide showing paleo-river channels. Note the old channels of the Satluj.

Chautang has a large number of Late Harappan sites associated with it and the Y3 channel seems to have been a living river during the PGW times. There is not yet sufficient data on the Y1 and Y2 channels for them to be dated.

Considerably more geomorphological and archaeological field work is required to fully document the vagrancy of these rivers. This work should also incorporate chemical/mineralogical analyses of core materials from the beds aimed at detecting the characteristic signatures of the relict rivers. Still it is obvious that in northern and western Rajasthan, tectonically unstable river systems were a major factor confronting human settlements, perhaps from the Pre-Harappan times onwards.

An aerial survey we carried out around Lothal has indicated an annular pattern of drainage which points to tectonic disturbances. We have concluded that either a tectonic uplift, or an eustatic fall, in the sea level was probably responsible for cutting off the Lothal dockyard from its feeder river and eventually from the access to the sea.

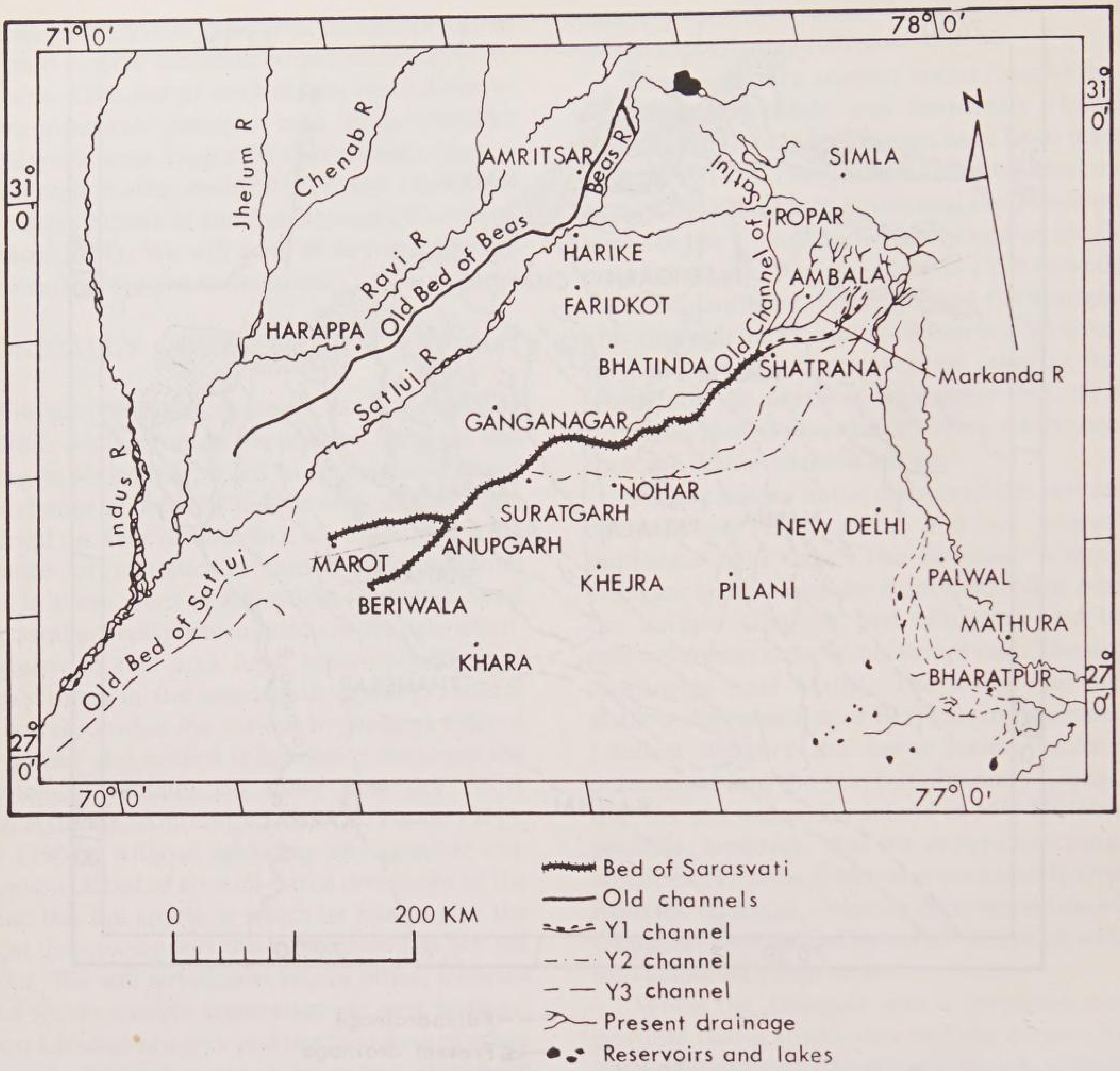

71° 0'
78° 0'
31° 0'
27° 0'
70° 0'
77° 0'
N
Indus R
Jhelum R
Chenab R
Ravi R
Old Bed of Beas
Beas R
Satluj R
Old Bed of Satluj
Old Channel of Satluj
AMRITSAR
SIMLA
ROPAR
HARIKE
AMBALA
FARIDKOT
HARAPPA
BHATINDA
SHATRANA
Markanda R
GANGANAGAR
NOHAR
SURATGARH
NEW DELHI
ANUPGARH
MAROT
BERIWALA
KHEJRA
PILANI
PALWAL
MATHURA
KHARA
BHARATPUR
0
200 KM
Bed of Sarasvati
Old channels
Y1 channel
Y2 channel
Y3 channel
Present drainage
Reservoirs and lakes

Fig. 19.4. The Indus, the Ghaggar and the Yamuna basins with paleochannels. Note the old courses, Y1, Y2 and Y3 of the paleo-Yamuna.

Another possible disturbance caused by tectonics was the alleged impounding of the Indus and the consequent engulfing of Mohenjodaro under a lake of mud and water (Raikes 1964: 284). Very serious objections have been raised against it by Lambrick (1967), Possehl (1967) and one of the authors (Agrawal 1971). But a lake around Mohenjodaro would have been a calamity since it would have killed the gallery forests, forced animals to migrate, denied any agriculture over a vast area, and made even local travel virtually impossible. It would have also created havoc with sanitation and the disposal of urban refuse (Agrawal 1971). A recent paper of Raikes and Dales (1977: 251) tries to answer some of the criticisms, though not very convincingly.

The formation of a dam like that proposed by Raikes and Dales may be possible and there is a historical case of the Allahbund caused by the 1819 earthquake. But it was breached by the very first flood of the Nara in 1926. How this bund could have lasted for hundreds of years on the Indus is difficult to understand especially with 500,000 cubic feet per second of water pushing at it on a narrow front (Lambrick 1967). Of course, such phenomena are possible in the upper courses of rivers, particularly in the mountainous regions. In fact there are lake remains on the upper reaches of the Indus and the Satluj, some of which have been examined by geologists. These appear to be of Pleistocene date.

SOME ARCHAEOLOGICAL IMPLICATIONS

It is obvious from this discussion that ecological stresses, caused both climatically and tectonically, played an important role in the life and decay of the Harappan Civilization.

Recent studies have tried to build theories using subsistence, population pressure, etc., by assuming that both technology and ecology were constant factors (Flam 1976: 76). Even technological changes need to be better documented (for example, there is evidence of a higher percentage of artifacts made of alloyed copper in the later levels than in the earlier ones), but to categorically declare, "there was no major climatic change in the Indus Valley during the third millennium B.C." (Flam 1976: 81) seems a bit premature. Archaeological theorizing may become easier by keeping several important factors constant, yet one cannot ignore the complexities of the situation. Before building models, one needs to look for, and examine, the paleo-environmental data.

An interesting analysis of the archaeological data has been recently attempted by Chakrabarti. He has calculated and compared the sizes of the various Harappan settlements and finds "a greater concentration of the large sites in the central Indus system, broadly in and around a rough triangle with Mohenjodaro, Harappa and Kalibangan as three points" (Chakrabarti 1979: 207). Between the Satluj and the Yamuna, he finds only smaller settlements. In Gujarat, only Kutch seems to have a concentration of larger sites.

What are the factors responsible for the concentration of larger settlements: agricultural land, raw materials, minerals, or communication/transport facilities? One thing, however, stands out: there is a dearth of village-level settlements, as even the smaller Harappan settlements appear to have an urban character. Towns are known to cater to the industrial and technical requirements, but they do not produce their own food. This is the responsibility of the village. To us it appears that the extreme vagrancy of the rivers in the Indus and the Ghaggar Valleys did not allow traditional villages to grow. Agriculture was probably based on the cover and meander flood plains, which were changing most of the time and therefore required the speed of urban management and resources, like the present day capitalist farming, to cope with the situation.

If Lothal had a dockyard, what determined its location? Was it the timber trade from the hinterland which justified the location of Lothal where it was? Did Lothal become defunct only because of floods, or tectonic uplift, or was it eustatic change that put it out of the reach of the sea?

Through this paper we have tried to focus attention on the ecological studies which should form an integral part of archaeological fieldwork. Only such an approach will allow us a deeper understanding of the Harappan phenomenon.

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BRIDGET ALLCHIN

20. Substitute Stones

THERE has always been a strong tendency on the part of archaeologists of South, Central and Western Asia to draw a fairly sharp demarkation line between those who concern themselves primarily with paleolithic studies, and deal with stones, and others who concentrate upon settlements from the Neolithic onwards. These latter scholars devote themselves to the study of pottery, and sometimes also architecture, objects d'art, ancient languages and other more specialized fields. This division is understandable when one recognizes that these two species of archaeology sprang on the one hand from the sciences, via geology and other field sciences, and on the other from the arts, via art history and ancient languages and literature. From quite an early stage the Stone People, or lithophiles, included microlithic industries within their field, and they began to recognize as time went on that these were often associated with Mesolithic Cultures which overlapped, in terms of time, other settled cultures in the world as a whole, or in the region in which they themselves worked. The Pottery People or ceramophiles, steadily worked their way back in time, delving deeper and deeper into the mounds formed by the continuous rebuilding of early towns and cities until they arrived at the preceramic levels. This situation raised, for both parties, a number of problems of terminology, and necessitated some careful thinking, and rethinking, about a variety of questions.

One outcome of the mutual re-evaluation on the part of both species of archaeologists is that some attention is now beginning to be paid to stone artifacts of many kinds that form an important part of all premetal-using cultures. This includes those associated with urban sites and large settlements, and indeed of all cultures prior to the fairly extensive introduction of iron for everyday purposes. Although the basic importance and usefulness of stone artifacts was always accepted, as the terms Neolithic and Chalcolithic clearly show, they once tended to be taken for granted, and were consequently dismissed without detailed consideration. The ceramophiles turned their attention to pottery and other objects of more "cultural significance."

Increasing interest in the beginnings of agriculture, both the domestication of animals and crop raising, and in ecological questions generally, has brought with it the need for a better understanding of the processes involved in the Neolithic transformation. Following from this is a renewed interest in the tools associated with these practices, and the ways in which they differ, if indeed they do differ, from those used by hunter-gatherers. This has lifted the study of stone artifacts onto a new, and somewhat more realistic plain. Instead of studying their shapes and the methods used to make them in a vacuum as old style paleolithic archaeologists or lithophiles were wont to do, it is now easier to see them as important parts of prehistoric man's life. They were tools largely used for making other tools, weapons and objects of wood or bone. They were component parts of composite tools such as arrows, spears, sickles, adzes, hammers, clubs, bolas, digging sticks, querns, mortars, whetstones, and so on. Thus the stone tools begin to come into focus as part of the processes involved in the subsistence and cultural activities of daily life.

In order to further understand the forces that drove some human groups to specialize in new activities, and live in new environments—in the case of the early stages of the Indus Civilization, to live on the strange, flat, unstable and stoneless but highly productive Indus Plain—it is helpful to try to reconstruct the part played by some of these artifacts and analyze the changes in the processes of food production and economic development that they reflect. In doing this it is important to try to project one's mind back to a time and a state of things before the introduction of iron—when mankind as a whole was conditioned to think of stone as serving many of the basic functions of daily life. Today one thinks of iron and steel as serving these functions in the form of knives and other household tools, axes, hammers, spades, and all sorts of carpentering and gardening tools, and so on. The main difference is that by the Harappan Period stone had been in use for tens of thousands of years, man had grown up with it, and he must have been profoundly conditioned to thinking in terms of stone. After all, iron has been in use for only three to four thousand years.

The immediate ancestors of the Harappan Civilization, as one understands the term today, are to be sought in regions around the Indus plains, and especially to the northwest, where stone was, and is, plentiful. They were conditioned to using it for tools and weapons, in a manner inherited from their paleolithic forebears. In many other cases, such as the Kot Dijians, they were also in the habit of employing stone for building house walls and footings, as well as massive town walls. Others used it for building irrigation *bunds* and channels. The inhabitants of the western borderlands today, even in this age of metals, plastic and high technology, continue to use stone for all these purposes, and many more. Boys, too young or too poor to possess fire arms, use stones as ammunition for small catapults, or throw them with great force and accuracy when hunting small birds and animals. They also attach them to a cord, as miniature bolas, to capture alive long-legged cranes and other birds.

Anyone who has taken part in, or read about, the exploration and excavation of early settlements in stonier regions surrounding the Indus plains, whether in the valleys of the northwestern borderlands, the foothills and valleys of the northern Punjab and western Himalayas, the lowlands of Rajasthan, or the hills of western Central India with their numerous caves and rock shelters, will have seen or noted many stone objects among the recorded finds. In some cases these are all that has survived, or at any rate been put on record. In addition to blade- and flake-based stone industries, which show a remarkable uniformity throughout the whole region, there are grinding stones and hammer stones of various types, as well as occasional stone axes, and very often the so-called mace heads or ring stones. Examination of the ring stones shows them all to have been made in a similar manner, that is by choosing a suitable stone and trimming it until it is more or less symmetrical. These are then laboriously pierced by working from each side until the two depressions meet, or almost meet. The surface is further dressed by hammering, and/or grinding and occasionally polishing. Spherical or near spherical stones, evidently worked into shape by a similar process of hammer dressing and grinding are frequently recorded alongside ring stones, and sometimes described as hammer stones. A factory site near Bannu in the N.W.F.P. where both types of stones were produced in considerable numbers during the Kot Dijian times (as well as earlier and probably later) was recently excavated by the Cambridge-Peshawar team as a part of the Bannu Basin Project. The often repeated hypothesis that ring stones were used both as mace heads and weights for digging sticks is supported by rock paintings in parts of India; but there is virtually no other direct evidence within the Subcontinent for either function. In western Asia they occur at sites of various periods and are referred to as mace heads, an identification followed by Marshall with respect to those found at Mohenjodaro and elsewhere, and now widely accepted. In southern Africa they are known to have been made and used as weights for digging sticks, and there is a certain amount of ethnographic evidence from India that points in the same direction; but so far as one knows this has never been fully investigated.

In view of the present day tendency to use selected stones as projectiles, it seems highly probable that ring stones, and spherical stones of various sizes were used in antiquity both as sling missiles and for throwing. Further, many worked stones, including the smaller ring stones may have served as bolas stones. The bolas stone (or stones), being attached to a long cord, is recoverable and therefore can be used again and again. In recent times, in Latin America, it has been recorded that it was held in a small leather bag attached to the end of the cord. This kind of repeated use would explain the very battered state of many spherical, or near spherical stones, found in this type of assemblage. Smaller ring stones, which do not appear to be large enough to serve as mace heads or digging stick weights, could have been attached to a cord and served as light bolas stones for capturing birds, etc., as in the case of the cranes noted above. Spherical and ovoid stones identified as sling pellets, on the basis of western Asiatic parallels, were recorded at Mohenjodaro by Marshall (1931: 35-36), but these appear to be greatly outnumbered by baked clay counterparts which will be discussed now.

It has been suggested that the discovery of copper, or the wider application of its use than hitherto, was one of the causes of the move into the plains, or at least one of the circumstances that made it possible. But how far this was the case, and how far the search for sources of copper may have been the result rather than the cause is questionable, and must remain so until a good deal of more detailed research has been done on the early phases of settlement on the plains and elsewhere.

Copper tools and utensils are a fairly important element in the material equipment of the Mature Indus Culture; but stone continued to be used throughout. Marshall remarked, as have many others following him, that Harappan copper weapons, unlike those of contemporary western Asiatic cultures, were rather ineffective in some respects. He goes on in the same passage to note the absence of arrow heads of stone or bone, "a fact that suggests the bow and arrow could not have been a favorite weapon" (Marshall 1931: 35-36).

In assemblages from urban sites at the beginning of the Mature Phase the range of types of stone artifacts, based upon a flake and blade technology, becomes rather abruptly limited almost exclusively to plain unretouched blades. At contemporary, non-urban sites an extensive range of artifacts went on being made. Throughout the Mature Indus Phase a considerable quantity of very fine stone blades continued to be made and used; although only a very small proportion were trimmed or reworked in any way. There is fairly conclusive evidence at Mohenjodaro, and probably at other sites also, that they, or the cores from which they were struck, were transported to the cities from workshop sites located at the sources of supply many miles distant (Allchin 1976). Thus, there must have been a genuine need for them. Stone objects of many other kinds were also imported. These include utilitarian objects such as querns, bead grinding stones, pallet stones, etc. Other stone objects of artistic and probably religious significance such as *lingas* or rare pieces of sculpture, and stone used for very limited building and constructional purposes (e.g. door sockets, drain covers, and certain other categories) were also imported, but all in strictly limited quantities. The difficulty of obtaining building stones may well have been one of the incentives behind the extensive manufacture and use of baked brick.

Pottery, itself once a substitute for leather and wooden vessels, appears at times to have been used as a substitute for stone. An obvious example of this is to be seen in the grooved pottery which, like Roman mortaria, must have taken the place of stone mortars for certain purposes. As is sometimes the case, the imitation, once developed, seems to have proved more adaptable and more convenient for certain purposes than the original. Other examples of ceramics being used as substitutes for stone can be recognized if one looks at, and thinks about, objects excavated from the major Mature Harappan sites.

There is one particular group of objects that I wish to consider rather more carefully for the purposes of this paper. These are the so-called terracotta sling pellets, terracotta cakes and other related groups of terracotta objects found very widely at Mature Harappan settlements, large and small. They are found rarely, or not at all, at earlier or later sites, nor for that matter in earlier or later levels at the same sites, nor with certain exceptions in contemporary cultures of adjacent regions. The almost universal and particular association of the triangular terracotta cakes with the Mature Harappan Culture has led some scholars, like the late Colonel Gordon and others, to conclude that they had a special significance in connection with ritual bathing or other ablutions (Gordon 1958). While I do not deny this may have been among their uses, I feel that this is altogether too narrow a view of their role especially when considered as part of a whole range of baked clay objects produced in large quantities.

In addition to their association with bathrooms, terracotta cakes are recorded as having been used as infilling, with and without charcoal, beneath brick-paved floors, as hard core for road building (Lal 1979) as well as a whole range of other situations, all of which suggest diversity rather than specialization. Their presence in hearths at Kalibangan (Thapar 1973: 101) may be noted in this connection as having possible religious significance. They also occur in large numbers at Allahdino and in smaller numbers at sites in Gujarat as mentioned in the papers (in this volume) by Professor W. Fairservis and R.N. Mehta respectively. It appears reasonable therefore, to regard them, together with other terracotta nodules produced in fairly large quantities, as substitutes for stone. It is from this basis that certain other, more specific uses of terracotta cakes, pellets, etc., can be considered.

Effective arrow and spear heads of either metal or stone are absent from Mature Harappan sites, but stone sling pellets have been recorded at both Early Indus (or Pre-Harappan) and Mature Indus (or Harappan) sites by Marshall (1931: 173), Mackay (1943 : 168), Wheeler (1968 : 76-77) and others. More recently their presence has been noted at a considerable number of sites of both periods widely distributed in the alluvial plains of the Punjab (personal communication from Dr. Rafique Mughal of the Pakistan Government Department of Archaeology). This suggests that to a certain extent stone for these purposes, or more probably finished stone artifacts, were carried in the course of trade onto the stoneless alluvial plains. Their weight must have made this a laborious and expensive process—much more so than in the case of stone blades which are individually small and light. This in turn suggests that a substitute for stone must have been sought by the plain dwellers. As already pointed out there is no evidence that the substitution was done through the extensive use of spears or arrows of any kind; although it is possible that sharpened hard woods were used for light arrows and spears. Since no wood has been found surviving from Early or Mature Harappan sites, this must remain an open question. But the emphasis upon stones used with catapults, and for throwing, in adjacent regions at the present time strongly suggests that the substitutes came from among the several kinds of terracotta cakes, pellets, etc., that were apparently used by the Harappans for many purposes, and produced in large quantities. Three quite independent observations combine to suggest this hypothesis.

1) There is Marshall's brief, but quite positive discussion of ovoid and spherical terracotta cakes. He identifies these as sling pellets upon the grounds that similar objects are used in contemporary western Asiatic cultures, and the situation in which one concentration of fifty or more was found in a large jar on the citadel at Mohenjodaro:

> Two types of sling-pellets are found at Mohenjodaro: one round and about the size of a marble, the other, which is more rare, ovoid in shape and averaging 2.5 inches long by 1.6 inches in diameter . . . . This type occurs in all levels. Both types are made by hand with varying degrees of finish. In all cases they were baked. The round pellets may have been propelled by a sling of ordinary type or by means of a bow such as is used in Sind in the present day for killing small birds . . . . Both ovoid and round sling pellets have been found in early Sumer and Turkestan sites as well as India (Marshall 1931: 466-67).

Marshall's identification of a main group, consisting of two types of terracotta sling pellets, was followed by Mackay and Wheeler. Both of the latter briefly refer to evidence for their use in the defense of cities. Wheeler further mentions finding in 1950 a concentration of 98 pellets at Mohenjodaro at the foot of the citadel mound, in the vicinity of the "great granary" (Wheeler 1968: 76). Another concentration is said to have been found near one of the gateways of Kalibangan (B.K. Thapar, personal communication). None of these excavators, however, considers the further implications of these deductions, nor discusses the questions in much detail. Only Marshall, with his extraordinary gift for seizing upon the significant detail among the mass of material he had to deal with, notes a little further on in the same passage as the one quoted above:

> The sling probably originated in stony country where ammunition would be plentiful. When its use extended to alluvial countries the pellets would naturally have been made of pottery. It is essentially a weapon for open country, and in the hands of a skilled man it is a formidable weapon (Marshall 1931: 467).

More recently the question has been briefly discussed by Sankalia in *New Archaeology: Its scope and application to India*. Here he points to the mention and identification of these objects as sling pellets by Marshall and others. He also sees a need for further research and experimentation as well as consideration of the implications these finds provide regarding Harappan warfare (Sankalia 1977: 68-69).

2) There is also the much more general observation which can be made in the light of all the discoveries made since Marshall's, and even perhaps since Wheeler's time. This is the present day situation which allows one to stand back a little and view the Indus Civilization in a rather wider focus, in relation to its own geographical setting, and to the contemporary cultures to north and northwest. When viewed in this way it is impossible to conceive of the vast area

spanned by sites of the Mature Indus Phase achieving such a level of uniformity of urban culture without some effective political and administrative control of the central region and the military power to maintain it and defend it from incursions from without. The manner in which Mature Indus Culture takes over from earlier cultures at certain peripheral sites, such as Kalibangan and others, tends to support this hypothesis. Therefore it follows that an Harappan army of some size could be raised and armed when necessary. The only armaments that have been found in sufficient numbers to meet the case are sling pellets. Moderate quantities of these are made of stone, and more liberal quantities of hard-baked clay. As Marshall observed, a sling with a supply of stones (or substitute stones) is "a formidable weapon in the hands of skilled man."

Further information supplied by R.N. Mehta and D.K. Chakrabarti supports Marshall's observations on the use of the sling for killing in Sind. Both recalled as young boys having used pellets made of clay, with a double stringed bow for hunting birds: one lived in Gujarat and the other in Bengal. Both say that the pellets were baked in an open fire, not fired in a kiln like pottery or bricks—an observation that might provide an alternative interpretation for those found in hearths at Kalibangan and elsewhere mentioned above. These recollections, and R.N. Mehta's further observation that both stone and baked pellets were used to chase predatory animals such as jackals away from grazing flocks and herds, suggest that they were part of a herdsman's equipment and personal possessions in the Harappan times, as in the less remote past. This in turn provides a possible interpretation of their presence in graves, along with other small objects, that was noted by Gordon (1958: 87).

3) The final observation, which caused me to consider these questions anew, I was able to make in the field thanks to the kindness of Professors F.A. Durrani and Farid Khan of the Department of Archaeology University of Peshawar. In the course of the last two seasons fieldwork they took me, and other members of the British Archaeological Mission, to visit the two sites they excavated near Dera Ismail Khan in the Dera Jat. Although only brief accounts have so far been published, many scholars are familiar, through Professor Durrani's lectures, with the impressive Chalcolithic settlement of Rahman Dheri. This site is laid out on a grid plan, surrounded by a substantial defensive wall, and passed through three phases of unbroken urban occupation which ended somewhat mysteriously around the beginning of the Mature Harappan Phase in the adjacent Indus plains. It may also be recalled that a small site, Hisham Dheri, several hundred meters to the northeast appeared to belong exclusively to the Mature Harappan Period. A small-scale excavation at Hisham Dheri confirmed this, and showed that it was apparently an industrial site, largely given over to the production of triangular terracotta cakes and terracotta sling pellets of the kind identified by Marshall and Wheeler. As the main occupation levels at Rahman Dheri yielded a number of fine stone arrow heads, but few if any terracotta sling pellets or cakes, the relationship of these two sites is highly problematic at first sight. The topmost levels of Rahman Dheri which might have provided further, more precise information have eroded away. But, examined in the light of the earlier observations brought together here, there seems to be one explanation which fits this situation: the town was besieged by an Harappan army and its inhabitants were finally overcome; and that during the seige the Harappan army camped and made its ammunition at Hisham Dheri. This would have been a convenient situation, just out of range of the archers within the city. It is possible that a similar *raison d'etre* may account for isolated Harappan industrial sites elsewhere in Pakistan.

If this hypothesis is accepted, it must lead to a further interesting development of the argument—the Harappans, far from being a nonviolent people, or being without any system of military organization other than that needed to defend their major cities, as has sometimes been suggested, must have had an effective army. How they raised their army is beyond the scope of this paper. It could have come primarily from the population of the cities and surrounding areas of intensive cultivation, or from other communities, such as the seminomadic peoples who must have formed an integral part of the wider Indus Culture, supplying draught animals for cultivation and local transport, and providing the means of long distance transport and trade both inside and outside the confines of the Harappan Empire, as such people did until recently and to some extent still do. But the probability that they had a highly organized, and therefore disciplined, army is inescapable. Indeed, when viewed from without it is in keeping with the character of the Culture as a whole. Further, this hypothesis would agree with the 'expansionist' tendencies in several directions noted by a number of excavators. This is where I shall stop with the suggestion that the concept of substitute stones, and its implications, may have some impact upon the view of the nature and structure of Harappan society.

ACKNOWLEDGMENTS

This paper puts forward observations made over a number of years when visiting Harappan and other early settlements, and traveling in the course of my own research and field work in western India and Pakistan. My gratitude to the Director and officers of the Department of Archaeology, Government of Pakistan for their help and courtesy in making this possible, and in particular for giving me, together with other members of the British Archaeological Mission to Pakistan, the opportunity to visit a number of major Harappan sites in Sind. My thanks to the present Director General of the Archaeological Survey of India, and other officers of the Survey for opportunities I have had over past years to visit Kalibangan and other sites, and to learn about their excavations. Finally, I am grateful to Professors F.A. Durrani and Farid Khan for showing us the sites of Rahman Dheri and Hisham Dheri and allowing us to see the materials in Peshawar.

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21. On the Composition and Technology of Harappan Microbeads

HARAPPANS loved ornaments. Their stone and terracotta figurines and the human figures carved intaglio on their seals (Marshall 1931: Pl. XXI; Mackay 1938: Pl. LXXV, LXXXVII, XCIV; Rao 1973: Pl. XXXIII) amply demonstrate how much they enjoyed adorning themselves with headbands, earrings, necklaces, bracelets, bangles and waistbands. Apparently, both men and women wore jewelry, an important part of which consisted of beads: a wide variety of beautiful beads. Almost all Harappan sites have yielded large quantities of these trinkets. Indian women who follow *Sanatana Dharma* wear black glass beads as a symbol of *Suasti* in their *Mangalsutra.* Abundance of beads at nearly all Harappan sites makes one wonder if the tradition of wearing beads as a symbol of *Suasti* originated in the Harappan Civilization.

Harappan beads are varied in their shape and material. Some are cylindrical, globular, spheroidal, biconical, segmented or wafer-like. Many a time, they are decorated with trefoil or circular designs. Materials including gold, silver, copper, carnelian, agate, chalcedony, steatite, shell and clay were used. The occurrence of these beads in abundance and in many varieties at nearly all Harappan sites, clearly shows how much they were appreciated. Some of the beads are very elegant and reveal skilled workmanship. They are an index to the sophisticated taste of the Harappans. They also demonstrate deftness, skill, patience and painstaking labor on the part of the craftsmen who made them. Among these fine quality ornaments are Harappan microbeads.

As relics, these tiny beads (Pl. 21.1) are of unique value to students of Harappan technology. They are very small, measuring one to three millimeters in length and one millimeter in external diameter. The diameter of the circular perforation at the center is one-half millimeter. Noting their minute form, Mackay observed (1937: 10) that they indicated craftsmanship of the highest quality, combined with extraordinarily good eyesight. They are hard: six to seven on the Moh Scale. When cleaned in dilute hydrochloric acid they become spotless white, immaculate and beautiful to behold. To the naked eye, they all look alike, uniform and regular in their cylindrical shape. Twisted strands of several strings of these fine beads would undoubtedly make, *"à la* Ajanta" (Ghosh 1967: Pl. XXII, XXIII, XXIV, XXXI, LXXXI), extremely attractive necklaces, bracelets, bangles or waistbands. No wonder the Harappans prized these beads so highly. The minute form, hardness and attractiveness of the microbeads are a witness to an advanced level of technology that the craftsmen used in their production. However, not much is known of that technology. Therefore carrying out a detailed examination of the beads was considered as a small but essential first step towards understanding that technology.

White microbeads have been recovered in the excavations at Harappa, Chanhudaro, Kalibangan, Lothal, Rojdi and Zekda (Fig. 21.1). However, so far, only the excavator of Chanhudaro has described them in some detail (Mackay 1937: 11, 12). The present study of these beads is based on the examination

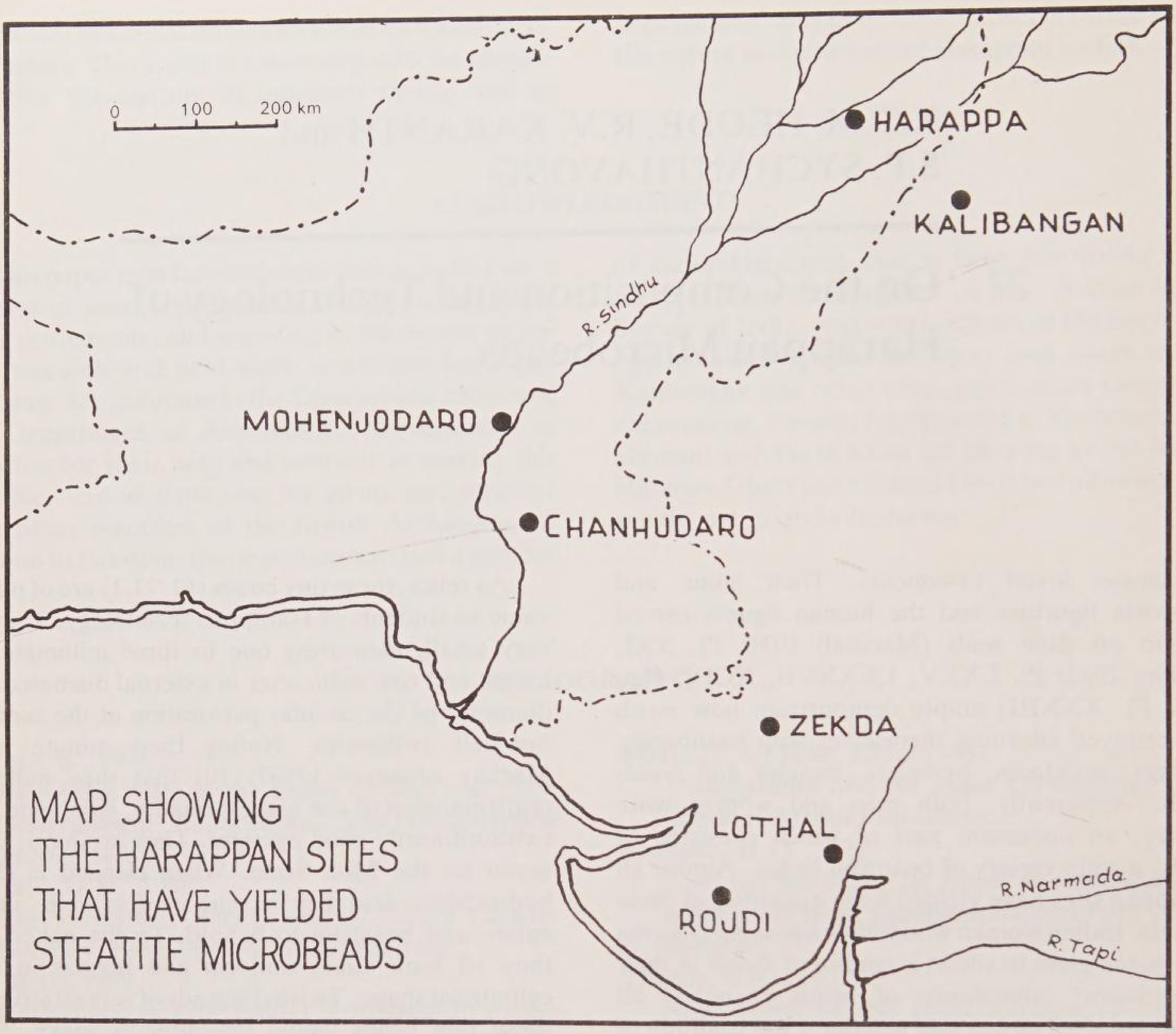
0 100 200 km
HARAPPA
KALIBANGAN
R. Sindhu
MOHENJODARO
CHANHUDARO
ZEKDA
MAP SHOWING
THE HARAPPAN SITES
THAT HAVE YIELDED
STEATITE MICROBEADS
LOTHAL
ROJDI
R. Narmada
R. Tapi

Fig. 21.1. Map showing sites that have yielded steatite microbeads.

of the specimens recovered in the excavation of the Harappan site at Zekda.

Zekda (lat. 23°53′ north; long. 71°26′ east) is an important Harappan site, located in Banaskanta District in the northern part of Gujarat State. Zekda was discovered by Parikh (1978: 188-90) and was excavated by the M.S. University of Baroda, during the field season of 1977-78, under the direction of Professor R.N. Mehta.

The excavation revealed a Harappan habitation of considerable duration. It yielded many characteristic types of Harappan pottery with some of the distinctive decorative motifs, perforated vases, terracotta cakes, chert blades, chert cores with crested ridge flaking, fragments of copper objects, together with the sherds of White Painted Black and Red Ware which is often referred to as "Ahar Ware." This Harappan settlement is, therefore, one of the relatively late Indus settlements, where the material remains of the Harappans merged, without any clear break, into that of the Post-Harappan Cultures. Among other important discoveries made in the excavation of the site are two hoards of microbeads.

The beads were found carefully preserved in two small pots. One of them (Pl. 21.2) was covered with a well-fitting, hollow, cork-like pottery stopper. The other pot (Pl. 21.3) was carefully placed inside another vessel and the outer pot covered with a solid, fitted, baked clay lump. Both the pots were found buried underneath house floors. They were recovered from layer two of Trench B, cut near the central part of the mound. The great care with which they preserved the beads at Zekda clearly shows how highly the Harappans valued them. At Chanhudaro a hoard of white microbeads was also found in a small pot (Mackay 1937: 12).

The stoppers covering the pots containing the beads recovered in the excavation at Zekda were found to be firmly sealed in the pots because of a superficial accumulation of calcium carbonate. Much care was therefore necessary when loosening the stoppers. In order to ensure that the solvent used to dissolve the carbonate accumulation near the mouth of the pots did not seep into the vessel, whose contents were then not known, the space between the lip and the stopper was covered with a layer of cotton wool. This was kept moist with drops of dilute hydrochloric acid, added at regular intervals (Pl. 21.4). The acid slowly dissolved the carbonate accumulation. When the evolution of carbon dioxide ceased, the used cotton wool was replaced with a fresh layer and the experiment was repeated until the stoppers became loose and could be easily detached.

When the contents of the pots were emptied on plateglass, thousands of microbeads were found carefully embedded in fine ash. There were also two gold beads, probably to be used at the center of the strings. The microbeads were separated from the ash using a set of sieves. The two pots together yielded 109.48 grams of beads and 206.53 grams of ash. Bead-ash ratio was nearly one to two. This was probably deliberate. Ash had apparently been put into the pots along with the beads to ensure that the tiny objects would not be completely scattered if the pots broke. In a one gram sample there were 310 beads. The Zekda pots therefore had approximately 34,000 beads.

EXAMINATION OF THE BEADS

The beads were first washed in dilute hydrochloric acid. Several washings in the acid and distilled water made them clean, even inside the perforation. The clean beads are stark white. They were dried in an oven at 110°C for 24 hours. After drying their hardness was determined. All the heads that were examined ranged between six and seven on the Moh Scale. Their specific gravity could not be determined accurately since it was impossible to drive out all the air bubbles trapped within the perforation when the beads were immersed in water.

A 100 milligram sample of the beads was taken from each of the two pots. These were fused and used for quantitative chemical analysis. The results of the analysis is given in Table 21.1. This shows that the bead material is nearly 60 percent silica, 30 percent magnesia, six percent alumina, less than two percent lime and less than one percent of iron oxide. This composition is interesting.

The chemical test shows that the beads were not made from pure talc ($4\ MgO\ 5\ SiO_2\ H_2O$) which is a hydrated silicate of magnesium. If the beads had been made of talc, they would not have contained six percent alumina. The presence of alumina suggests the presence of Kaolinite in the composition of the original material used in the production of the beads. Kaolinite ($Al_2O_3\ 2\ SiO_2\ 2H_2O$) is a hydrated silicate of aluminium. It is one of the pure forms of clay. From the percentage composition of the beads, the initial inferrence was that the Harappan beadmakers deliberately mixed talc and Kaolinite in the ratio of five to one. However, we soon found out that such a material occurred naturally with the metamorphosed ultrabasic rocks. The material is known as talcose steatite. Heron (1953: 371-72, 389) records the occurrence of a long discontinuous schistbelt, rich in various forms of steatite, including talcose steatite, within the Aravalli Hills. This starts from Ambaji in Sabarkanta District, near Zekda, and extends towards the Punjab through Sehore, Ajmer and Jaipur Districts in Rajasthan. We therefore believe that the Harappan beadmakers used the naturally occurring, locally available, talcose steatite as their raw material for producing white microbeads.

To obtain a proof for the above observation, an X-ray diffraction analysis of a powdered sample of the beads was carried out. The X-ray diffraction patterns (Pl. 21.5) revealed the presence of silica in the form of cristobalite and anhydrous magnesium silicate in the form of enstatite. Both were faintly marked on the X-ray plate due to their poor crystallinity. Alumina appeared to be represented by extremely faint lines because of its poor crystallinity coupled with the very small proportion in the sample. Nevertheless, the results are of tremendous value.

When talc is heated below 800°C no appreciable change should be noted by microscopic examination. The first noticeable change occurs in the neighborhood of 850°C, where talc decomposes, giving off its water of crystallization and forms cristobalite and enstatite and becomes hard in the process (Insley and Frechette 1955: 80). We have found that steatite when heated at 900°C for two hours improves its hardness from one to seven on the Moh Scale.

Steatite is a soft stone with a soapy feel. It is therefore known as soapstone. Talc, the chief component mineral of steatite has a hardness of one on the Moh Scale. It can be easily carved. Harappans used it to make many objects which included some of their seals and larger beads. The above analysis shows that they used talcose steatite for making microbeads.

Now the question is: how were these minute beads made? Mackay submitted the white microbeads recovered from Chanhudaro to Beck for their examination in 1936, and commented on the technique of their manufacture: "After carefully examining a modern watchmaker's drill which is capable of drilling holes of 0.01 inch (0.25 millimeters) diameter, it is difficult to believe that either the drill or the bead could have been held by the hand, so I suggest that some form of lathe or jig must have been used" (Mackay 1937: 10). However, it is difficult to visualize the possibility of such fine and precise lathes or jigs within the framework of known Harappan technical infrastructure. The instruments used in the manufacture of the beads necessarily had to be much simpler.

The hardness of the beads (six to seven on the Moh Scale) shows that they were baked at high temperature. The cut edges of the beads on examination at 15 power magnification were found to be even, almost smooth and slightly oblique (Pl. 21.6). If the beads were cut after they were baked, the hard brittle material would have produced rough, uneven, corrugated edges. It therefore appears that the beads were cut before they were hardened by baking.

The sides of the beads when examined under the microscope, were found to be furrowed along their length (Pl. 21.7). These striation marks appear to be slightly twisted. When we examined a few joined beads, that is, two or three beads joined together, cut but not separated, we noticed that the striation marks ran continuously from one bead to the other. Though the beads appeared to the naked eye to be regular in their cylindrical shape, under the microscope they were clearly faceted. Their perforations were also faceted. These observations are most interesting. For, where two beads are found almost joined, with their striation marks coinciding, it appears that they must have followed one another through an aperture. In other words, it appears that the beads were manufactured by extruding the forming material through an aperture(s). The beads are faceted because the nearly circular apertures through which they were extruded were also faceted. They are striated along their length because the apertures were corrugated. The striations have a twist because the composition forming the beads appears to have passed through the aperture under some pressure. F.A. Bannister and G.F. Claringbull, the other two scientists to whom Mackay referred the Chanhudaro beads for their examination in 1936, also considered their manufacture by extrusion. But they did not think it possible because they were not able to visualize how tubes rather than solid rods were produced by such an extrusion process (Mackay 1937: 11).

Table 21.1. Percentage composition of Harappan microbeads recovered from Zekda

Sample No.	SiO_2	MgO	Al_2O_3	CaO	H_2O_3	Total
1	60.80	30.76	5.95	1.58	0.60	99.69
2	59.75	31.42	5.80	1.88	0.77	99.62

CONCLUSION

From the foregoing discussion it has been seen that the beads were made from talcose steatite. They were cut before they were hardened by baking. Their faceted surfaces and the striation marks along their length indicate that they were produced by squeezing a compound under pressure through apertures. This compound appears to have been in a paste form. If it was in a solid form the pressure needed to extrude it through very small openings would have been very high. There is no evidence to believe that the Harappans had the technology necessary to produce such high pressures.

We therefore suggest, keeping in view the known Harappan technological infrastructure, the following simple process as a plausible method for the manufacture of these microbeads. All that is needed is a circular copper or bronze disc with a few one-millimeter diameter perforations near the center. Each perforation must have a copper or bronze wire of 0.5 millimeter diameter with one end soldered or riveted near the perforation and the other end bent and positioned to be at the center of the perforation as shown in figure 21.2. The disc has fine holes at its periphery which allow it to be stitched all around to a

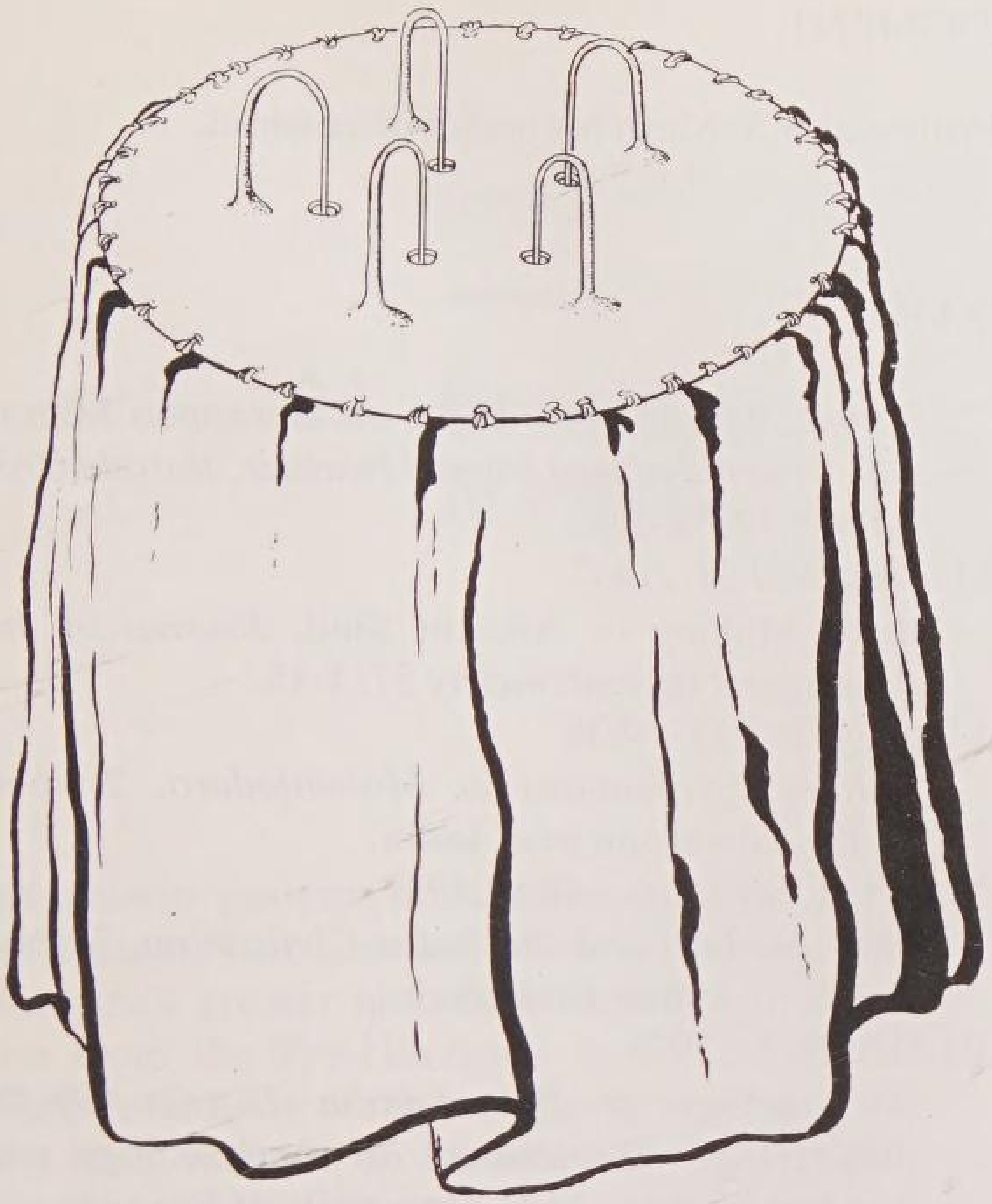

Fig. 21.2. A plausible device that could have been used by the Harappans to manufacture steatite microbeads.

well-knit piece of cloth. If into this device a paste of finely ground talcose steatite is put and the cloth gathered together and squeezed by hand, talcose steatite paste emerges through the perforations as tubes. These soft tubes can be cut as they emerge, at quick intervals, to convert them into microbeads. Three skillful persons are necessary to do the job: one for squeezing the paste, the second for cutting the soft tubes and the third for collecting the soft microbeads, over a layer of fine ash on a dish, to avoid damaging them. The beads can then be baked at 900 to 1000°C in a kiln to harden them. We have adequate evidence to believe that Harappans had the necessary infrastructure to attempt such a process.

They had copper and bronze discs. There is even evidence of perforated examples (Mackay 1938: Pl. CXXI). They knew both soldering and rivetting. They sometimes soldered the rivet by pouring molten copper or bronze around its base for additional firmness (Marshall 1931: 489). They had cloth (Marshall 1931: 585-86). The soft tubes appear to have been cut by a thin, sharp device to convert them into microbeads. A simple device to serve this purpose is a horse hair. Harappans had horses (Marshall 1931: 653-54; Joshi 1972: 135). The fact that they could melt copper at 1080°C, clearly shows that they had suitable kilns or open fires with a forced draught to raise the temperature of the fire to 1200°C so as to bake the beads at 1000°C.

It appears probable therefore, that the Harappan microbead makers produced these beautiful, tiny beads by means of a simple process. But it was, nevertheless, a laborious, painstaking, unhurried job. Like the other ancient Indian craftsmen who produced good quality metal objects or ceramics (Hegde 1973: 416-21; 1975: 187-90; 1979: 141-55), the Harappan microbead makers also spared no pains in their efforts to achieve a high level of excellence in their work.

ACKNOWLEDGMENT

The authors wish to thank Professor R.N. Mehta and Professor S.S. Merh for useful discussions.

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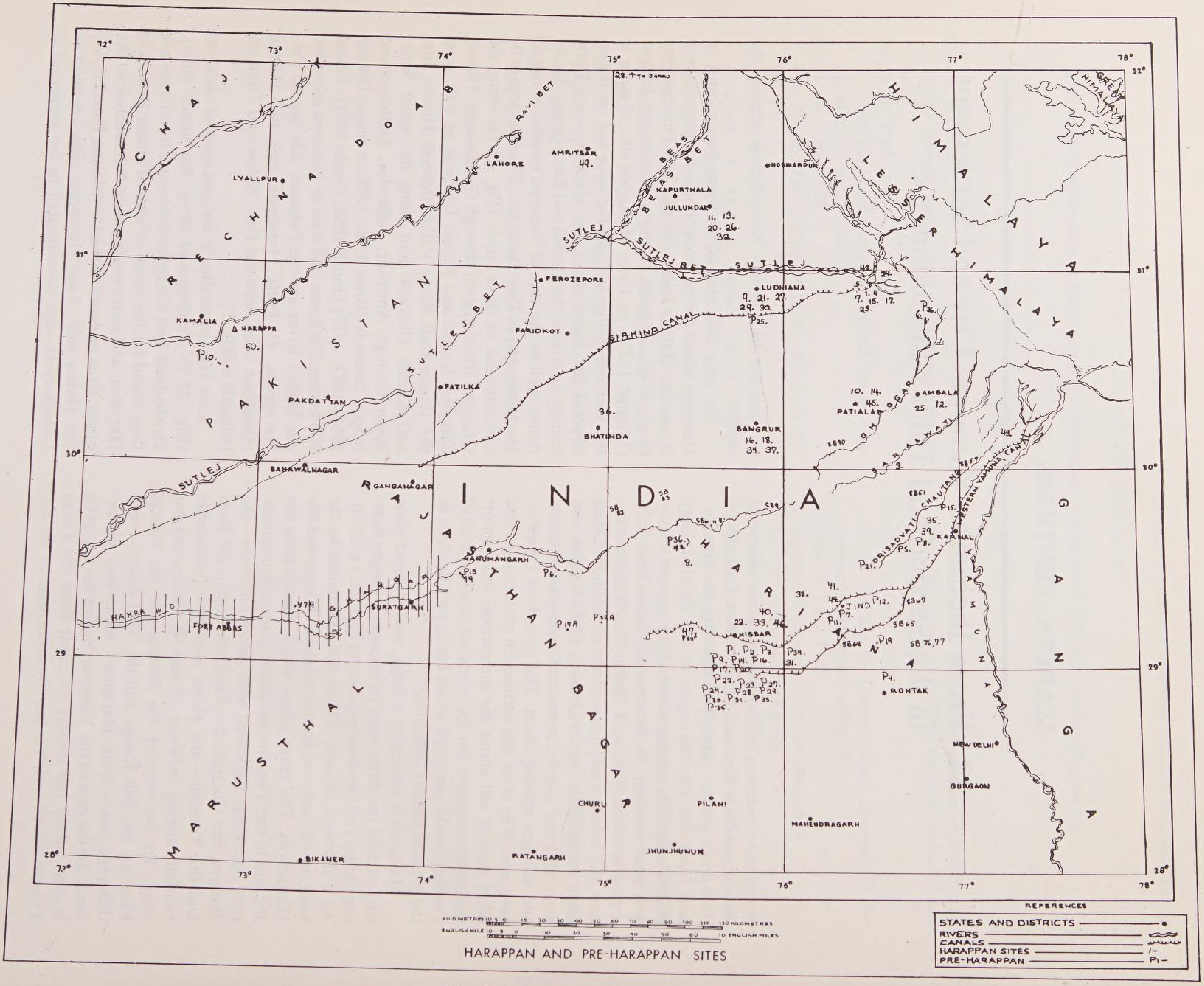
22. From Jhelum to Yamuna: City and Settlement in the Second and Third Millennium B.C.

SETTLEMENT patterns around Harappa are unique in the ancient Near East and Indus Valley. On maps of Harappa's greater hinterland showing site distribution from the Pre-Harappan to the Painted Gray Ware Period, the northern Indus City appears to exist in a near vacuum. In an area which has been subjected to much field work and archaeological attention, this is a very unusual settlement situation. Other early urban cities, Mohenjodaro, Kish, Nippur, and Susa all have closely connected networks of towns and villages around them. The questions I explore here are: Why does this settlement pattern exist and what does it tell about the interaction and support networks necessary for the existence of a major city? Further, what can it tell about Harappa's function in the greater Indus Civilization?

Harappa is central to a large, well-watered plain surrounded on three sides by mountain ranges bearing varied and fabulous resources (Figs. 22.1 to 22.3). At a distance of only 300 to 400 kilometers to the west, north and east lie the Sulaiman Range and the Himalayas. The great plains which stretch from the Jhelum to the Yamuna are of one piece, environmentally speaking. Endowed with six major rivers—the Jhelum, the Chenab, the Ravi, the Sutlej, the Beas and the Yamuna—the plains also have predictable rainfall ranging between 20 and 70 centimeters per year. To the west of the Jhelum, rise the Potwar Plateau, the Salt Range and the Thal desert—very different areas from Harappa's immediate hinterland. To the east of the Yamuna, begins the Gangetic Basin, subtly but clearly different from the Great Punjab Plain, which is heavily influenced by the desert and the dry and bare Aravalli rock ridges to the south.

The only two sites in the immediate vicinity of Harappa which can be thought of as contemporary to it are the Mature Indus site of Chak Purbane Syal (Vats 1940), 15 miles to the southeast and Jalilpur (Mughal 1972), an Early Harappan site 30 miles to the southwest. Far away to the west and northwest beyond the Indus are a few Harappan and Early Harappan sites in the Gomal and Taxila areas. Settlements well to the east of Harappa number about 50 Harappan and 36 Pre-Harappan.[1] These appear to be concentrated in three areas (Fig. 22.1): along the Ghaggar River system through Ganganagar, Hissar, Sangrur, Karnal and Patiala Districts, as well as up the Drishadvati River Valley through Hissar, Jind and Karnal Districts, and along the upper Sutlej River through Amritsar, Jullundur, Ludhiana and Ropar Districts (Bisht 1976, 1978, in press; Dikshit 1968, 1977, 1979; Ghosh 1952; Pande 1977). About 200 kilometers south and west of Harappa along the old Hakra River on the Pakistan side are 32 Pre-Harappan, 41 Early Harappan and 166 Mature Harappan sites between Fort Abbas and Derawar (Mughal 1980).

Late Harappan sites in the east number about 90 (Fig. 22.2) concentrated along the upper Sutlej, Drishadvati and Ghaggar-Sarasvati. In no case are they found further south or west of Hissar District in Haryana, and some are found in the direction of the upper Beas in Amritsar and Gurdaspur Districts. On the Hakra side, Late Harappan sites—defined as Cemetery H—are concentrated to the southwest of



HARAPPAN AND PRE-HARAPPAN SITES
REFERENCES
STATES AND DISTRICTS
RIVERS
CANALS
HARAPPAN SITES
PRE-HARAPPAN
KILOMETRES 10 5 0 10 20 30 40 50 60 70 80 90 100 110 120 KILOMETRES
ENGLISH MILE 10 5 0 10 20 30 40 50 60 70 ENGLISH MILES
72° 73° 74° 75° 76° 77° 78°
28° 29 30° 31° 32°
CHAJ DOAB
RECHNA DOAB
PAKISTAN
INDIA
RAJASTHAN BAGAR
MARUSTHAL
HARIANA
GANGA
YAMUNA
HIMALAYA
LESSER HIMALAYA
GREAT HIMALAYA
RAVI
RAVI BET
BEAS
BEAS BET
SUTLEJ
SUTLEJ BET
SIRHIND CANAL
GHAGGAR
SARASWATI
DRISADVATI-CHAUTANG
WESTERN YAMUNA CANAL
HAKRA W.D.
LYALLPUR
LAHORE
AMRITSAR
49.
KAPURTHALA
JULLUNDAR
11. 13. 20. 26. 32.
HOSHIARPUR
28. ↑ TO JAMMU
KAMALIA
HARAPPA
50.
P10.
FEROZEPORE
FARIDKOT
FAZILKA
PAKDATTAN
LUDHIANA
9. 21. 27. 29. 30.
P25.
42.
24.
5.
7. 1. 4. 15. 17. 23.
6.
P26.
PATIALA
10. 14. 45.
AMBALA
25. 12.
43.
BHATINDA
36.
SANGRUR
16. 18. 34. 37.
SB90
SB87
3.
BAHAWALNAGAR
GANGANAGAR
SB83
SB82
SB9
SB6, 7, 8
SB61
P15.
35.
39.
P5.
P8.
KARNAL
P21.
P36.
48.
8.
HANUMANGARH
P13
19
P6.
SURATGARH
FORT ABBAS
47A
P17A
P32A
38.
41.
44.
JIND
P12.
P7.
P11.
SB67
SB65
40.
22. 33. 46.
HISSAR
47.
P22
P1. P2. P3.
P9. P14. P16.
P17. P20.
P22. P23. P27.
P24. P28. P29.
P30. P31. P33.
P35.
P34.
31.
SB68
P19
SB 76, 77
P4.
ROHTAK
NEW DELHI
GURGAON
CHURU
PILANI
MAHENDRAGARH
JHUNJHUNUN
RATANGARH
BIKANER

Fig. 22.1 Harappan and Pre-H

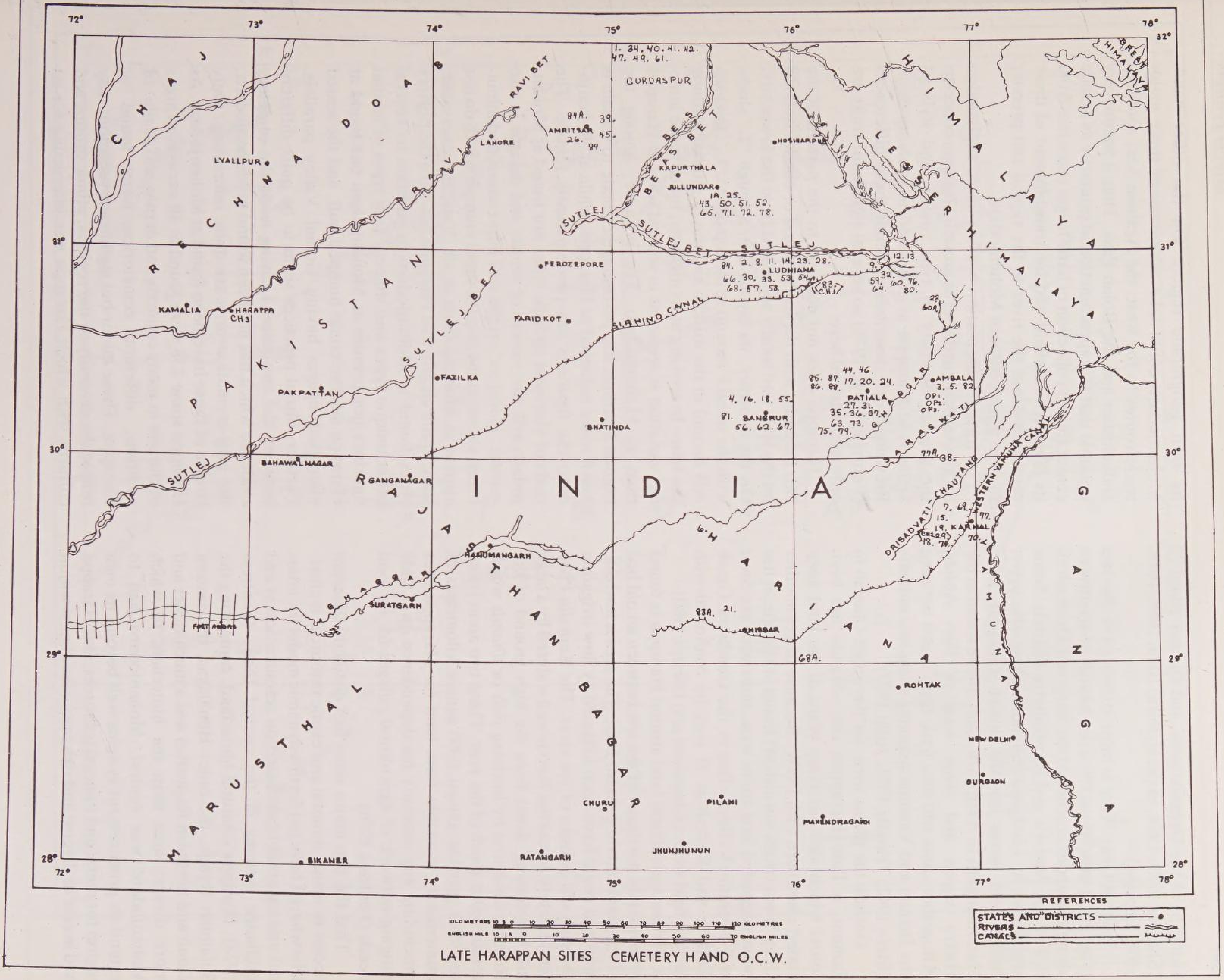

LATE HARAPPAN SITES CEMETERY H AND O.C.W.
REFERENCES
STATES AND DISTRICTS
RIVERS
CANALS
KILOMETRES
ENGLISH MILES
72° 73° 74° 75° 76° 77° 78°
32° 31° 30° 29° 28°
GREAT HIMALAYA
HIMALAYA
LESSER HIMALAYA
CHAJ DOAB
RECHNA DOAB
PAKISTAN
INDIA
RAJASTHAN BAGAR
MARUSTHAL
HARIANA
GANGA
YAMUNA
RAVI
RAVI BET
BEAS
BEAS BET
SUTLEJ
SUTLEJ BET
SIRHIND CANAL
WESTERN YAMUNA CANAL
GHAGGAR
SARASWATI
DRISADVATI-CHAUTANG
LYALLPUR
KAMALIA
HARAPPA CH3
LAHORE
AMRITSAR
GURDASPUR
HOSHIARPUR
KAPURTHALA
JULLUNDAR
FEROZEPORE
FARIDKOT
FAZILKA
PAKPATTAN
BHATINDA
BAHAWALNAGAR
GANGANAGAR
HANUMANGARH
SURATGARH
FORT ABBAS
LUDHIANA
SANGRUR
PATIALA
AMBALA
KARNAL
HISSAR
ROHTAK
NEW DELHI
GURGAON
MAHENDRAGARH
PILANI
JHUNJHUNUN
CHURU
RATANGARH
BIKANER
1. 34. 40. 41. 42. 47. 49. 61.
84A. 39. 45. 26. 89.
1A. 25. 43. 50. 51. 52. 66. 71. 72. 78.
84. 2. 8. 11. 14. 23. 28. 66. 30. 33. 53. 54. 68. 57. 58.
83. CH3
12. 13.
9. 32. 59. 60. 76. 64. 80.
22. 60R.
44. 46. 85. 87. 17. 20. 24. 86. 88.
27. 31. 35. 36. 37. 63. 73. 6. 75. 79.
4. 16. 18. 55.
81. 56. 62. 67.
3. 5. 82.
OP1. OP2. OP3.
77A. 38.
7. 69. 77. 15. 19. CH29. 48. 74. 70.
83A. 21.
68A.

Fig. 22.2. Late Harappan, Cemetery H and OCP sites.

Harappa in the Derawar area, and number about 72 (Sharma 1973, 1976, in press; Suraj Bhan 1969, 1973, 1976, in press).

Painted Gray Ware is most numerous in the east (Fig. 22.3) with about 180 sites, heavily concentrated along the upper reaches of the Sarasvati-Drishaḍvati in Patiala, Ambala and Kurukshetra districts. Some are found in Ludhiana-Jullundur along the upper Sutlej and some in the lower Ghaggar from Hanumangarh to Anupgarh. Only 10 are found in the Hakra region and these west of Fort Abbas. Altogether some 650 sites have been found between the Jhelum and Yamuna spanning some two millenia (Stein 1942; Tripathi 1975; Joshi 1977).

Outside the plains area, on the upper Chenab in Jammu, a Late Harappan site—Manda has been found which also has Gray Ware of the kind associated elsewhere with PGW. Because of yet another Gray Ware (thick burnished) found at this site, it has been suggested that there were links with the Swat and Kashmir Valleys. Ties to the Gandhara Grave Culture and Burzahom II may be confirmed with further field work (Khazanchi and Dikshit 1980).[2]

Prime agricultural land around Harappa is found immediately northeast of the site between an old bed of the Ravi and the present Ravi. The area is lowlying land and could have been irrigated by flow irrigation through old *bundhs* of the river. The Kamalia Plain immediately across the Ravi is well watered by a large hill *nai* flowing down from the high ground of the Rechna *doab* and by lowlying *jhils* or *dhands* which retain water much of the year. These two areas taken together provide almost 6600 square kilometers of immediately available farm land for Harappa thus precluding any necessity for dependence on a wide ranging network of agricultural villages for its food needs (Fentress 1976).

That the two major cities had distinctly different access to stone, mineral and exotic resources is clear. Elsewhere I have put forth a dynamic model for internal and external trade based on resource access and exchange systems in the central Indus (Fentress 1978). Harappa's natural hinterland, comprising the Sulaiman Range, the outer Himalayas, the eastern *Doab* and northern Rajasthan was a much richer and more diverse area than the hinterland to which Mohenjodaro was central. Mohenjodaro had to extend its procurement systems well beyond its own region for metal and mineral resources. But Harappa had access to diverse and rich resources almost within its own geographic region. On the other hand, Mohenjodaro could take advantage of three major trade routes to the west: the Arabian Sea, southern Baluchistan and the Bolan Pass. Thus it seems very possible that Harappa functioned primarily as a trade center for the collection of hard-to-get resources from its diverse hinterland and for transhipment of these resources down the river to the capital and premier foreign trade center of Mohenjodaro.

A further observation bearing on an explanation for the settlement patterns around Harappa concerns the greater diversity in type, motif, and style of artifacts at Harappa as compared to Mohenjodaro. Previous work describes in detail these differences (Fentress 1976, 1978) so several significant traits are only summarized here:

Harappa does not conform to the pattern of the two mounds, with the high mound or citadel isolated on the west and totally separated from the lower city. On the contrary, its layout is in a rough "L" shape with the small F mound at the top of the "L," the high AB mound in the middle and the G mound forming the base. In looking at its artifacts, much more internal variation is apparent in several ways at Harappa than at Mohenjodaro. For instance, among the human figurines the percentage of male to female is much more balanced at Harappa, while at Mohenjodaro the figurines are predominantly female. The seals of Harappa include types not found at Mohenjodaro and the variety of motifs and designs is also greater. Harappa, on the seal impressions and miniatures, shows many diverse small animals which do not appear at Mohenjodaro at all. Vats, the excavator, states quite clearly that Harappa has all of the pottery types found at Mohenjodaro in addition to several other unique types and shapes. Two types of animal figurines not present at Mohenjodaro but found at Harappa are the crude humped bull, and the seated elongated figures having Gomal Valley parallels. Further, burial practices seem to be quite different between the two sites. Leaving aside the cemetery evidence which has not been found at Mohenjodaro, the post-cremation urns are quite interesting. Only twelve of these have been found at Mohenjodaro. At Harappa some 238 were found in all excavated areas of the site in many contexts and depths and *in situ*. In addition, different cemeteries were found at Harappa. These minor but significant variations may reflect the diversity of the regions, ethnic groups and cultures with which Harappa was interacting for its

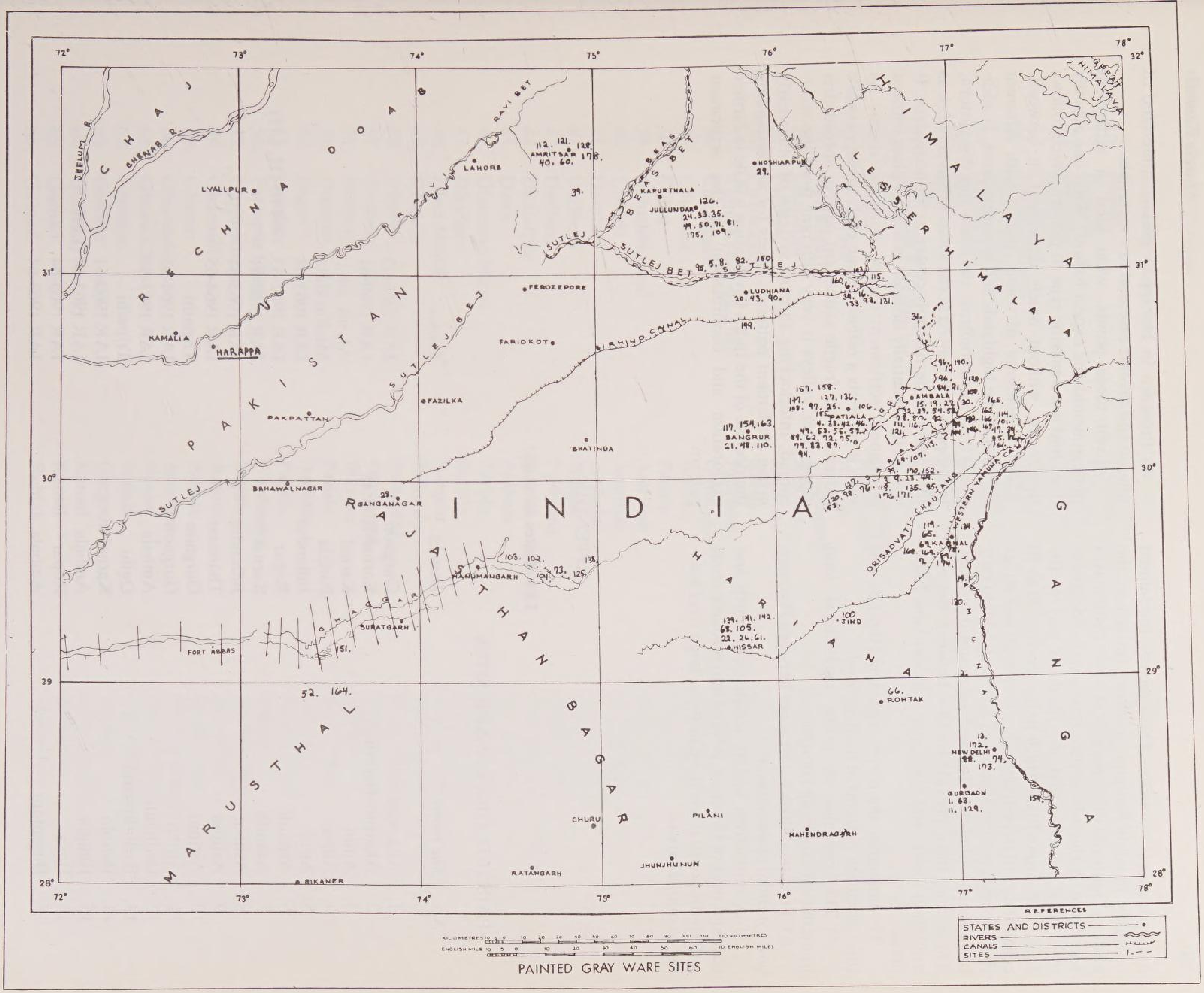

PAINTED GRAY WARE SITES
REFERENCES
STATES AND DISTRICTS
RIVERS
CANALS
SITES
KILOMETRES
ENGLISH MILE
GREAT HIMALAYA
HIMALAYA
LESSER HIMALAYA
CHAJ DOAB
RECHNA DOAB
PAKISTAN
INDIA
RAJASTHAN BAGAR
MARUSTHAL
HARIANA
GANGA
JHELUM R.
CHENAB R.
RAVI BET
BEAS BET
SUTLEJ BET
SUTLEJ
SIRHIND CANAL
WESTERN YAMUNA CANAL
DRISADVATI-CHAUTANG
GHAGGAR
LYALLPUR
KAMALIA
HARAPPA
LAHORE
AMRITSAR
KAPURTHALA
JULLUNDAR
HOSHIARPUR
FEROZEPORE
LUDHIANA
FARIDKOT
FAZILKA
PAKPATTAN
BAHAWALNAGAR
GANGANAGAR
BHATINDA
SANGRUR
PATIALA
AMBALA
KARNAL
HANUMANGARH
SURATGARH
FORT ABBAS
HISSAR
JIND
ROHTAK
NEW DELHI
GURGAON
BIKANER
RATANGARH
CHURU
PILANI
JHUNJHUNUN
MAHENDRAGARH

Fig. 22.3. Painted Gray Ware sites.

nonagricultural resources. These include the Jammu foothills, possibly Kashmir, northern Rajasthan, the eastern *Doab* and other areas of the outer Himalayas where the six rivers have their headwaters. Moreover it is very probable that the northern part of the Jhelum-Yamuna Plain which today receives 50 to 70 centimeters of dependable annual rainfall was under thick forest cover in Harappan times, and could only have been inhabited by mobile pastoral groups. These may have provided a link between the rich mountain areas, and Harappan and southern Indus areas.

To summarize the points regarding Harappa and the settlement patterns of its hinterland:

1) The presence of prime agricultural land immediately adjoining Harappa.

2) Presumed thick forest cover between Harappa and essential resource areas.

3) A multi-river system fanning out north and east and west of Harappa, leading into resource areas and to the south converging into one large river leading to market areas.

4) Presence in Harappa's greater hinterland of unique and diverse essential raw materials.

Given these points, what kind of settlement pattern would one expect to find? What one actually does find is a dendritic type of pattern which follows the rivers, without much settlement in between. There is evidence of some contact with different cultures in the highlands and resource areas. If additional field work confirms and maintains this pattern, Harappa is best viewed in the Indus urban network as the main northern supply center to Mohenjodaro. It was a city essentially isolated in a large plain without permanent settlement except along the rivers. As such it presents a rather unique early urban network pattern. This fragile settlement pattern spread thin along river valleys is very different from the widespread, interlocking support systems of other early urban settlement patterns. Clues for understanding the decline of the Indus Civilization will lie in further exploration and confirmation of this settlement pattern.

APPENDIX

List of sites on maps[3]

PAINTED GRAY WARE SITES

No.	*Site name*	*District*	*Source*
1.	Aharwan	Gurgaon	IAR 1966-67
2.	Akarpur-Baroth	Karnal-Rohtak	IAR 1960-61
3.	Amin	Karnal	AI, no. 10
4.	Alipur	Patiala	Madhu Bala
5.	Apra	Jullundur	IAR 1963-64
6.	Arnauli	Ropar	IAR 1962-63, 1964-65 (H, LH)
7.	Asandh	Karnal	IAR 1960-61
8.	Ashaur	Jullundur	IAR 1963-64
9.	Astipur	Thanesar	IAR 1964-65
10.	Astipur	Gurgaon	Tripathi
11.	Autha	Gurgaon	IAR 1964-65
12.	Badhauli	Ambala	IAR 1963-64
13.	Badli-ki-sarai	Delhi	Tripathi
14.	Bahola	Karnal	IAR 1960-61
15.	Balana	Ambala	IAR 1963-64 (LH)
16.	Bara	Ropar	IAR 1963-64
17.	Basantaur	Ambala	IAR 1963-64

No.	*Site name*	*District*	*Source*
18.	Basrai	Gurdaspur	Madhu Bala
19.	Baterla	Ambala	AR 1964-65
20.	Baundal	Ludhiana	Madhu Bala
21.	Bhasaur	Sangrur	Madhu Bala
22.	Bhiwani Khera	Hissar	IAR 1966-67
23.	Bibipur-Kalan	Karnal	IAR 1964-65
24.	Bir Basiem	Jullundur	Tripathi
25.	Brass	Patiala	Madhu Bala
26.	Burj	Hissar	IAR 1966-67
27.	Chadiala Khanpur	Ambala	IAR 1962-63
28.	Chak	Ganganagar	Tripathi
29.	Chajja	Hoshiarpur	Tripathi
30.	Chamkaur	Ambala	Tripathi
31.	Chandigarh	Chandigarh	IAR 1970-71 (H, KLB, B)
32.	Chandpur	Ambala	Tripathi
33.	Charan	Jullundur	Tripathi
34.	Chaunkair	Ropar	IAR 1953-54
35.	Chini-Kanjri-da-Theh	Jullundur	Madhu Bala
36.	Chitorgarh	Gurdaspur	Tripathi
37.	Chudiala	Ambala	IAR 1964-65
38.	Chhai	Patiala	Tripathi
39.	Chhichhariwal	Amritsar	IAR 1966-67
40.	Chhina	Amritsar	Madhu Bala
41.	Damla	Ambala	IAR 1963-64
42.	Dadhera	Patiala	Madhu Bala
43.	Dadheri	Ludhiana	Madhu Bala
44.	Daulatpur	Karnal	IAR 1960-61, 68, 69 (LH)
45.	Deen	Ambala	IAR 1963-64
46.	Dhammo Majra	Patiala	Madhu Bala
47.	Dhangeri	Patiala	Madhu Bala
48.	Dher Majra	Sangrur	Madhu Bala
49.	Dhuleta	Jullundur	IAR 1963-64
50.	Dhuderi	Jullundur	Madhu Bala
51.	Dodwan	Gurdaspur	Tripathi
52.	Dotheri	Bikaner	Tripathi
53.	Dudhan	Patiala	Madhu Bala
54.	Dugri	Ambala	Tripathi
55.	Durd	Patiala	Madhu Bala
56.	Fattupur Dher	Gurdaspur	Tripathi
57.	Gajju-Khera	Patiala	Madhu Bala
58.	Ghanauli	Ambala	AI, no. 10
59.	Gharan	Patiala	Madhu Bala
60.	Gharinda	Amritsar	Madhu Bala
61.	Ghaswa 2	Hissar	IAR 1966-67
62.	Gheoria	Patiala	IAR 1966-67
63.	Gohana	Gurgaon	Tripathi
64.	Gudana	Karnal	IAR 1964-65
65.	Gumad	Karnal	Tripathi
66.	Gumad	Rohtak	Tripathi

No.	*Site name*	*District*	*Source*
67.	Hamirpur	Karnal	Tripathi
68.	Hansi	Hissar	IAR 1963-64
69.	Hardo-Rawal-Khurd	Gurdaspur	Tripathi
70.	Haripur	Gurdaspur	Tripathi
71.	Haripur	Jullundur	IAR 1961-62
72.	Hasali	Patiala	Madhu Bala
73.	Humayan Khera	Hissar	IAR 1967-68
74.	Indrapat	Delhi	Tripathi
75.	Isar Hol	Patiala	Madhu Bala
76.	Jalkhedi	Karnal	IAR 1964-65
77.	Jhansla	Patiala	Madhu Bala
78.	Jorasi Khurd	Karnal	Tripathi
79.	Kalon	Ambala	IAR 1963-64
80.	Kardhan	Ambala	IAR 1963-64
81.	Kartarpur	Jullundur	Madhu Bala
82.	Katpalon	Jullundur	IAR 1963-64
83.	Kauli	Patiala	Madhu Bala
84.	Khanpur	Ambala	IAR 1964-65
85.	Khannwala	Gurdaspur	Tripathi
86.	Khera	Ambala	IAR 1964-65
87.	Khijrabad	Patiala	Madhu Bala
88.	Khera-Kalan	Delhi	Tripathi
89.	Kheri	Karnal	Tripathi
90.	Kheri Nand Singh	Ludhiana	Madhu Bala
91.	Kotla Nihang	Ropar	Tripathi
92.	Kumbra	Patiala	Madhu Bala
93.	Kurukshetra	Karnal	Tripathi
94.	Ladhora	Ambala	IAR 1964-65
95.	Lataur	Patiala	Madhu Bala
96.	Lukhi	Karnal	IAR 1964-65
97.	Jorasi Khurd	Karnal	IAR 1960-61
98.	Kalayat	Jind	IAR 1966-67 (Pre-H, H)
99.	Kal Khera	Ambala	IAR 1963-64
100.	Kariwali 1 (Dharampur)	Hissar	IAR 1967-68
101.	Kariwali 2 (Majjal Ther)	Hissar	IAR 1967-68
102.	Kariwali 3	Hissar	IAR 1967-68
103.	Kaulgarh	Hissar	IAR 1966-67
104.	Kauli	Patiala	IAR 1968-69
105.	Kheri	Karnal	IAR 1960-61
106.	Lakhnaur Sahib	Ambala	IAR 1963-64
107.	Madhopur	Jullundur	IAR 1956-57
108.	Mahorana	Sangrur	Madhu Bala
109.	Mallaur	Ambala	IAR 1963-64
110.	Marari Khuro	Amritsar	IAR 1962-63
111.	Mehawa Kheri	Karnal	IAR 1964-65
112.	Mehbubpur	Ambala	IAR 1964-65
113.	Merhanwal	Ropar	Madhu Bala
114.	Mirzapur	Ambala	IAR 1963-64
115.	Moonak	Sangrur	IAR 1968-69

No.	*Site name*	*District*	*Source*
116.	Morthali	Karnal	IAR 1960-61
117.	Monhali	Karnal	Tripathi
118.	Murthala	Karnal	IAR 1964-65
119.	Murarikhurd	Amritsar	Madhu Bala
120.	Mustafabad	Ambala	IAR 1966-67
121.	Nagar	Jullundur	IAR 1963-64
122.	Nagiari	Ambala	IAR 1962-63, 64-65
123.	Nakora	Hissar	IAR 1967-68
124.	Nao	Jullundur	Tripathi
125.	Nandpur-Kesho	Patiala	Madhu Bala
126.	Natthurpur Toda	Amritsar	IAR 1965-66
127.	Palwal	Gurgaon	Tripathi
128.	Panirt	Karnal	Tripathi
129.	Panjola	Ropar	Madhu Bala
130.	Pathorheri	Ambala	Tripathi
131.	Patharheri Choti	Ropar	IAR 1962-63, 64-65
132.	Pehowa	Karnal	Tripathi
133.	Raja Karna-ka-Qila	Karnal	IAR 1970-71
134.	Rajgarh	Patiala	Madhu Bala
135.	Ramsaran Majra	Karnal	IAR 1964-65
136.	Raniya (Lahoronwali Theri)	Hissar	IAR 1967-68
137.	Ratta Tibba	Hissar	IAR 1966-67
138.	Rohan	Ambala	IAR 1964-65
139.	Rupan Wali	Hissar	IAR 1966-67
140.	Rupan Wali 2	Hissar	IAR 1966-67
141.	Rupar	Ropar	Tripathi
142.	Sadhaura	Ambala	IAR 1963-64
143.	Sakala	Gurdaspur	Tripathi
144.	Salaura	Ambala	Tripathi
145.	Salaha	Patiala	Madhu Bala
146.	Samdu	Patiala	Madhu Bala
147.	Sanghol 3	Ludhiana	IAR 1969-70, 70-71
148.	Saprota	Jullundur	IAR 1963-64
149.	Sardargarh	Ganganagar	Tripathi
150.	Sarsa Bhor	Karnal	?
151.	Sasa Talhedi	Karnal	IAR 1964-65
152.	Satanj	Sangrur	Madhu Bala
153.	Seal	Patiala	IAR 1964-65
154.	Secta	Ambala	IAR 1963-64
155.	Shebbupura	Patiala	Madhu Bala
156.	Sialu	Patiala	Madhu Bala
157.	Sihi	Gurgaon	IAR 1969-70
158.	Singh	Ropar	IAR 1962-63, 64-65
159.	Suga	Ambala	IAR 1963-64
160.	Such	Ambala	IAR 1965-66
161.	Sunam	Sangrur	Madhu Bala
162.	Surawalli	Bikaner	Tripathi
163.	Talapur	Ambala	Tripathi
164.	Tandiwal	Ambala	IAR 1963-64

No.	*Site name*	*District*	*Source*
165.	Tandiwal	Ambala	IAR 1964-65
166.	Teora	Karnal	Tripathi
167.	Thal	Karnal	IAR 1968-69
168.	Thanesar City Mound	Karnal	IAR 1964-65
169.	Theh Polar	Karnal	IAR 1963-64
170.	Tilpat	Delhi	Tripathi
171.	Timarpur	Delhi	Tripathi
172.	Topra Kala	Karnal	IAR 1968-69
173.	Uehha-Lutera	Jullundur	Madhu Bala
174.	Urnai	Karnal	IAR 1960-61
175.	Vedala Garanthian Sahar	Gurdaspur	Tripathi
176.	Vadala (Granthian)	Amritsar	Madhu Bala

LATE HARAPPAN

No.	*Site name*	*District*	*Source*
1.	Aechal Sahib	Gurudaspur	
2.	Apara	Jullundur	Joshi 1977
3.	Badala (2)	Ludhiana	Madhu Bala
4.	Badhauli	Ambala	IAR 1963-64
5.	Bahwa	Sangrur	Madhu Bala
6.	Balana	Ambala	IAR 1963-64
7.	Banawali	Hissar	ME
8.	Banehra	Karnal	IAR 1966-67
9.	Banrai	Ludhiana	Madhu Bala
10.	Bara	Ropar	Madhu Bala
11.	Barwali	Ludhiana	Madhu Bala
12.	Bassigujaran	Ropar	Madhu Bala
13.	Bathlana	Ropar	Madhu Bala
14.	Baundal	Ludhiana	Madhu Bala
15.	Bhagwanpura	Kurukshetra	PT
16.	Bhasaur	Sangrur	Madhu Bala
17.	Bhasmara (Burj)	Patiala	Madhu Bala
18.	Bhudan	Sangrur	Madhu Bala
19.	Bodha	Karnal	IAR 1966-67
20.	Brass	Patiala	Madhu Bala
21.	Burj	Hissar	IAR 1966-67
22.	Chandigarh	Chandigarh	Madhu Bala
23.	Chandiala	Ludhiana	Madhu Bala
24.	Chever-thal-Kalal	Patiala	Madhu Bala
25.	Chini-Kanjri-da-Theh	Jullundur	Madhu Bala
26.	Chaina	Amritsar	Madhu Bala
27.	Dadhera	Patiala	Madhu Bala
28.	Dadheri	Ludhiana	Madhu Bala
29.	Daulatpur	Karnal	IAR 1968-69
30.	Daheru	Ludhiana	Madhu Bala
31.	Dhammo Majra	Patiala	Prufer 1951

No.	*Site name*	*District*	*Source*
32.	Dher Majra	Ropar	Prufer 1952
33.	Doraha	Ludhiana	Prufer 1952
34.	Dodwan	Gurudaspur	Madhu Bala
35.	Dure	Patiala	Madhu Bala
36.	Gajju-Khera	Patiala	Madhu Bala
37.	Galoraddi	Patiala	Madhu Bala
38.	Garhi Radan	Kurukshetra	Joshi 1977
39.	Gharinda	Amritsar	Joshi 1977
40.	Gurdasnangal-da-Theh	Gurdaspur	Joshi 1977
41.	Hardo-Rawal-Khurd	Gurdaspur	Joshi 1977
42.	Haripur	Gurdaspur	Joshi 1977
43.	Haripur	Jullundur	Joshi 1977
44.	Hasali	Patiala	Joshi 1977
45.	Her	Amritsar	Joshi 1977
46.	Isar Hol	Patiala	Joshi 1977
47.	Jagvia	Gurdaspur	Madhu Bala
48.	Jatheri	Karnal	IAR 1966-67
49.	Kanwa	Gurdaspur	Madhu Bala
50.	Karalan	Jullundur	Madhu Bala
51.	Kartarpur	Jullundur	Madhu Bala
52.	Katpalon	Jullundur	Madhu Bala
53.	Khera	Ludhiana	Madhu Bala
54.	Kheri Nand Singh	Ludhiana	Madhu Bala
55.	Khokari 1	Sangrur	IAR 1966-67
56.	Khokari 2	Sangrur	IAR 1966-67
57.	Kohada	Ludhiana	Madhu Bala
58.	Kotmandial	Ludhiana	Madhu Bala
59.	Kubhrai	Ropar	Madhu Bala
60.	Kurari	Ropar	Madhu Bala
60A.	Kurdi	Chandigarh	Suraj Bhan 1973
61.	Lohgarh	Gurdaspur	Madhu Bala
62.	Mahorana	Sangrur	Madhu Bala
63.	Majiri	Patiala	Madhu Bala
64.	Manala	Ropar	Madhu Bala
65.	Malsian	Jullundur	Madhu Bala
66.	Manupur	Ludhiana	Madhu Bala
67.	Manoharpur	Sangrur	IAR 1966-67
68.	Mathan	Ludhiana	IAr 1965-66
68A.	Mitathal IIB	Hissar	Suraj Bhan 1969
69.	Mohanpur	Karnal	IAR 1966-67
70.	Mohna	Karnal	IAR 1977-67
71.	Nagar	Jullundur	Madhu Bala
72.	Nauli	Jullundur	Madhu Bala
73.	Nagwan	Patiala	Madhu Bala
74.	Neesamg 2	Karnal	IAR 1966-67
75.	Panandian	Patiala	Madhu Bala
76.	Pallanpur	Ropar	Madhu Bala
77.	Pilana	Karnal	IAR 1966-67

No.	*Site name*	*District*	*Source*
77A.	Pipli	Kurukshetra	Joshi 1977
78.	Rahon	Jullundur	Madhu Bala
78A.	Raja-Karna-ka-Qila		
79.	Rajgarh	Patiala	Madhu Bala
80.	Rampur	Ropar	Madhu Bala
81.	Rohira	Sangrur	Madhu Bala
82.	Sandhai	Ambala	IAR 1965-66
83.	Sanghol	Ludhiana	IAR 1966-67, 70-71
83A.	Siswal II B		
84.	Somavi	Ludhiana	Madhu Bala
84A.	Sosan	Amritsar	Joshi 1977
85.	Seel	Patiala	Madhu Bala
86.	Suni Arkheri	Patiala	Madhu Bala
87.	Uccha-Gaon	Patiala	Madhu Bala
88.	Uchcha-Khera	Patiala	Madhu Bala
89.	Vadlan	Amritsar	Madhu Bala

HARAPPAN

No.	*Site name*	*District*	*Source*
1.	Arnauli	Ropar	IAR 1962-63, 64-65 (LH)
2.	Baola	Karnal	IAR 1966-67
3.	Bara-Samana	Ropar	IAR 1962-63. 64-65 (LH)
4.	Bikkun	Ropar	IAR 1953-54
5.	Chandigarh	Chandigarh	IAR 1970-71 (Pre-H, KLB, B)
6.	Chaunkair	Ropar	IAR 1953-54
7.	Chimur	Hissar	IAR 1966-67
8.	Daheru	Ludhiana	IAR 1961-62
9.	Dharmheri	Patiala	IAR 1966-67
10.	Dhogri	Jullundur	IAR 1956-57
11.	Dukheri	Ambala	IAR 1963-64 (LH)
12.	Fategarh-Neuan	Ludhiana	IAR 1963-64
13.	Gheora	Patiala	IAR 1966-67
14.	Hawara	Ropar	IAR 1953-54
15.	Jind Bir Bada Ban	Sangrur	IAR 1966-67 (Pre-H)
16.	Ka-inor	Ropar	IAR 1962-63, 64-65 (LH)
17.	Kalayat	Sangrur	IAR 1966-67 (Pre-H, PGW)
18.	Kalibangan	Ganganagar	IAR 1967-68 (Pre-H, KLB)
19	Katpalon	Jullundur	IAR 1963-64 (PGW)
20.	Kheri Nand Singh	Ludhiana	IAR 1961-62
21.	Khirka	Hissar	IAR 1966-67 (Pre-H)
22.	Kotli	Ropar	IAR 1953-54
23.	Kotla Nihang Khan	Ropar	Madhu Bala
24.	Kurrara-Kurrari	Ambala	IAR 1962-63, 64-65 (LH)
25.	Madhopur	Jullundur	IAR 1956-57
26.	Madiala-Kalan	Ludhiana	IAR 1965-66
27.	Manda	J & K	

No.	Site name	District	Source
28.	Manikpur-Sharif	Ludhiana	IAR 1962-63 (LH)
29.	Manupur	Ludhiana	IAR 1961-62
30.	Mitathal	Hissar	Suraj Bhan 1973
31.	Nagar	Jullundur	IAR 1963-64 (PGW)
32.	Pali 2	Hissar	IAR 1966-67 (Pre-H)
33.	Pauli	Sangrur (Jind)	IAR 1968-69
34.	Pujam	Karnal	IAR 1966-67
35.	Raja Sirkap	Bhatinda	IAR 1958-59
36.	Rahina	Sangrur	Madhu Bala
37.	Rakhigarhi	Hissar	IAR 1966-67 (Pre-H)
38.	Ratta Khera	Karnal	IAR 1966-67
39.	Ratta Theh	Hissar	IAR 1966-67 (Pre-H)
40.	Ritoli	Jind	IAR 1966-67
41.	Rupar	Ropar	LK (LH)
42.	Sandeh	Jagadhari	IAR 1963-64
43.	Sangat Pura	Jind	IAR 1966-67
44.	Sasi	Patiala	IAR 1966-67
45.	Sisai	Hissar	IAR 1966-67 (Pre-H)
46.	Siswal	Hissar	IAR 1966-67 (Pre-H)
47.	Tar Khanwala Dera	Ganganagar	Ghosh 1952
48.	Vanawali (Banswali)	Hissar	IAR 1966-67 (Pre-H)
49.	Wazir Bhullar	Amritsar	IAR 1964-65
50.	Chak Purbane Syal	Sahiwal	Vats 1940

PRE-HARAPPAN SITES

No.	Site name	District	Source
1.	Alipur Kharar, 1	Hissar	IAR 1966-67
2.	Alipur Kharar, 2	Hissar	IAR 1966-67
3.	Alipur Kharar, 3	Hissar	IAR 1966-67
4.	Balian	Rohtak	Suraj Bhan 1973
5.	Bani	Hissar	Suraj Bhan 1973
6.	Barsana, 2	Jind	IAR 1966-67
7.	Farmana	Karnal	Suraj Bhan 1973
8.	Dachar	Karnal	IAR 1966-67
9.	Ghaswa 1	Hissar	IAR 1966-67
10.	Jalilpur	Sahiwal	PA 1967
11.	Jind Bir Badaban	Jind	IAR 1966-67
12.	Kalayat	Jind	IAR 1966-67
13.	Kalibangan	Ganganagar	IAR 1966-67
14.	Kirka	Hissar	IAR 1966-67
15.	Manak Majra	Karnal	Suraj Bhan 1973
16.	Mata Shyam	Hissar	IAR 1966-67
17.	Milakpur 3	Hissar	IAR 1966-67
18.	Pali 2	Hissar	IAR 1966-67
19.	Paoli	Hissar	Suraj Bhan 1973
20.	A. Nohar	Ganganagar	Pande 1977

No.	*Site name*	*District*	*Source*
21.	Patan 1	Hissar	IAR 1966-67
22.	Rakhigarhi	Hissar	IAR 1966-67
23.	Rakhi Shahpur	Hissar	IAR 1966-67
24.	Rattan Theh	Hissar	IAR 1966-67
25.	Saleem Garh	Hissar	IAR 1966-67
26.	Sanghol	Ludhiana	IAR 1966-67
27.	Sarangpur	Chandigarh	Suraj Bhan 1973
28.	Satrod Khurd 1	Hissar	IAR 1966-67
29.	Satrod Khurd 2	Hissar	IAR 1966-67
30.	Shahpur	Hissar	IAR 1966-67
31.	Sisai 1	Hissar	IAR 1966-67
32.	Sisai 3	Hissar	IAR 1966-67
33.	Siswal	Hissar	IAR 1966-67
34.	Sothi	Ganganagar	Pande 1977
35.	Talwara	Hissar	IAR 1966-67
36.	Tigrana	Hissar	Suraj Bhan 1973
37.	Theraj (Chakko)	Hissar	IAR 1966-67
38.	Vanawali	Hissar	IAR 1966-67

NOTES

[1] A word about the preparation of the distribution maps is necessary. The site lists attached as the Appendix were compiled from *Indian Archaeology:* A review—1953 to 1972, Ancient India, Pakistan Archaeology, Ancient Pakistan, various site reports mentioned in the bibliography and numerous journal articles also cited in the bibliography. No new field work was conducted to prepare the lists, nor was any field checking done for the published sites. Two publications which were very useful for the Painted Gray Ware and Late Harappan sites were Tripathi (1975) and Madhu Bala (1978).

A very real difficulty lies in terminology. The publications consulted spread over almost 30 years, and definitions have changed during this time. Thus what one excavator may call Late Harappan may not be what another excavator calls Late Harappan. Bara sites have been included in Late Harappan because of the available ^{14}C dates, although the excavator has proposed earlier dating. New evidence will give us a clearer picture. Mature Harappan sites are listed as about 50, but they may in fact be much less if carefully looked at, with some of these falling into the Late Harappan category. Only a small percentage of the sites were published with exact locational data, either geo-coordinates or direction and distance from a town site (estimated 10 percent of the list). Therefore the sites whose location is given only by district have been placed in linear order under the district town name. This of course causes considerable distortion to the true picture, and limits the map and its interpretation to certain general uses. Still, it was felt that preparation of the map was worthwhile for some purposes, and it may inspire the publication of greater locational detail for the listed sites.

[2] Painted Gray Ware has been reported from a site near Srinagar by Converse (1978).

As yet this find has not been confirmed either by an archaeologist or the Archaeological Survey.

[3] Abbreviations used in the Appendix:

Sources:

IAR	Indian Archaeology: A review (by year)
AI	Ancient India (by number)
Madhu Bala	Madhu Bala, 1978
Tripathi	Tripathi, 1975
ME	Man and Environment, Vol. 2
PT	Puratattva, no. 8
LK	Lalit Kala 1-2, 1955
PA	Pakistan Archaeology, 1967

Abbreviations following the source:

Pre-H	Pre-Harappan
H	Harappan
LH	Late Harappan
KLB	Kalibangan
B	Bara
PGW	Painted Gray Ware

These abbreviations are used to indicate that the site is a multiperiod site and includes pottery from other periods.

Indian Archaeology: A review was used as a source for all the published issues from 1953 on. Other journals cited above were searched for sites from the beginning of publication.

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SHEREEN RATNAGAR

23. The Location of Harappa

MOHENJODARO and Harappa (Fig. 23.1) are the largest known Harappan settlements. The artifactual remains at these sites indicate that a significant proportion of their inhabitants were engaged in activities other than food production: that, in fact, they were truly urban in character. Reference here is to the public buildings including public stores, the evidence for manufacturing, the exceptionally large number of seals, and the wide range of materials excavated at the two sites.

These two cities seem to have been headquarters for administration, collection points for tax or tribute, production centers for particular goods and the loci of exchanges. They are also located in river valleys with a fairly uniform distribution of resources and where there are no barriers to communication. Given these situations one would expect both cities to be located within easy access to rural Harappan settlements; in other words, to be centrally located with smaller settlements surrounding them on all sides. But this is not so, especially in the case of Harappa.

Data on Harappan site location in the greater Indus Valley reveal two regions with relatively dense settlements: the lower Sarasvati Valley, and lower Sind. Mohenjodaro is not located at the center of a polygonal or circular field. There are few sites to its north or west. Jhukar does lie on the Larkana plains but Judeirjodaro, near Jacobabad, and Pathiani Kot at the mouth of the Mula Pass, appear to be outposts rather than satellites of Mohenjodaro. Mohenjodaro was located in the northern part of the Harappan-occupied area of Sind. Historically, Larkana has been the most productive region of Sind. Thus local fertility, as well as access to trade routes over the Bolan and other more southerly passes, were major factors in the location of Mohenjodaro.[1]

Where Harappa is concerned, the eccentricity of location appears to be even more marked. Aside from Chak Purbane Syal and Vainiwal, the nearest known cluster of settlements lies in Cholistan, some 150 kilometers to the south.

Vats (1940: 1) believed that in the Harappan times Montgomery District was watered by several streams: two branches of the Ravi, an old course of the Beas, two minor streams, as well as the Sutlej. There is no evidence, of course, for necessarily dating these old channels to the third millennium. But there is no reason to doubt that, at the regional level, land utilization in Sind during the third millennium would have presented a contrast to that in southwestern Punjab, just as it does today. The Indus in Sind is aggrading its bed and flows on a ridge higher than the surrounding plain. Thus, flood waters flow out to an appreciable distance from both banks of the river. In the lower Punjab, however, the rivers are entrenched and the strip of new alluvium available along their banks for farming is significantly narrower than in Sind. Nineteenth century reports on Montgomery District describe vast tracts of land between the annually flooded tracts of the Ravi and Sutlej. These could not be cultivated but only put to seasonal pasture (Gazetteer of the Montgomery District 1884). Thus village communities, as such, did not exist in the arid "bars" of the southern Punjab until the introduction of canal irrigation during the British rule. Compact villages with joint claims over land only developed in the fertile riverine tracts which benefited from annual flooding. Nomadic herding was the dominant occupation in the harsh environment of the "bars"

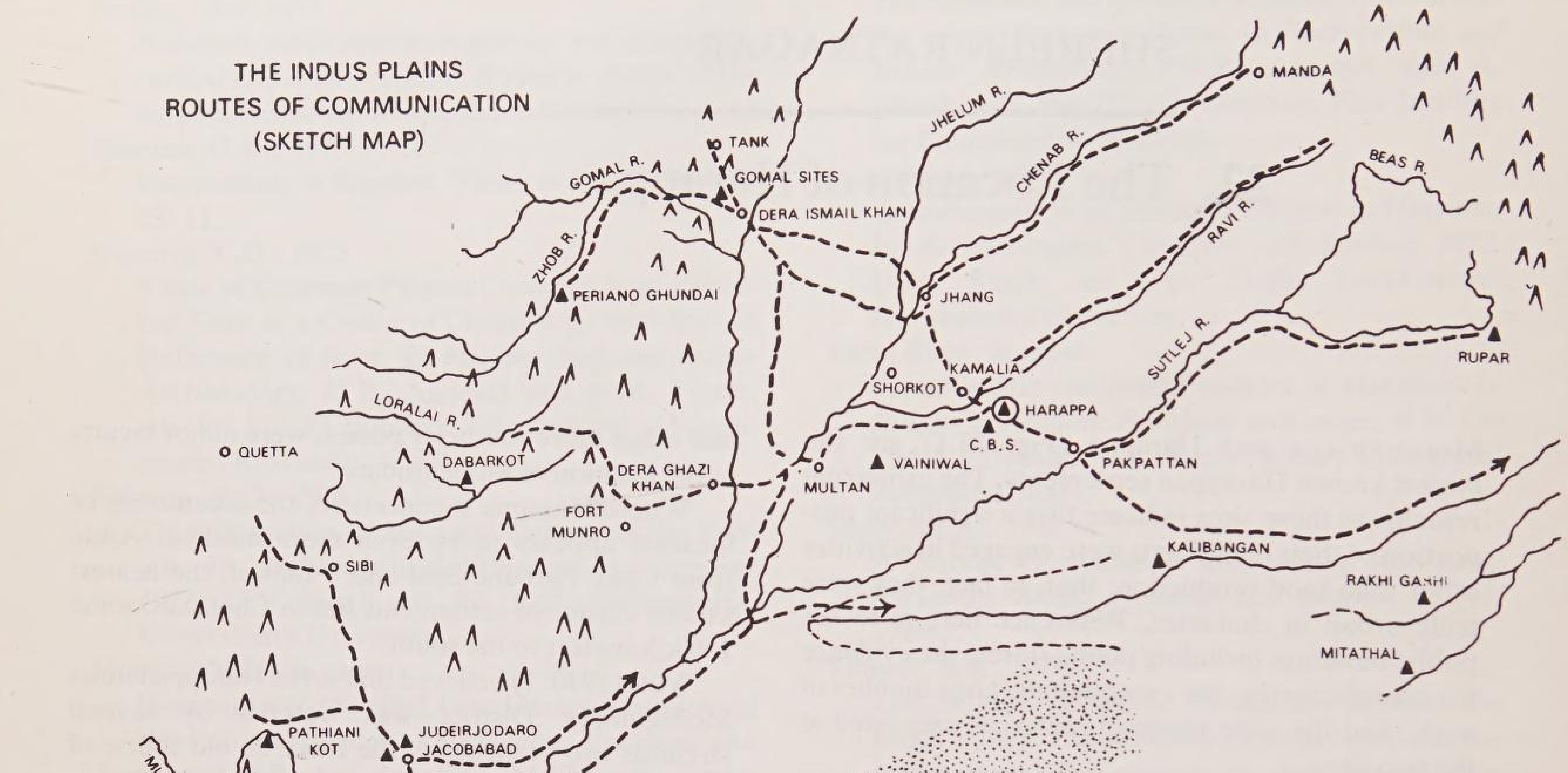
THE INDUS PLAINS
ROUTES OF COMMUNICATION
(SKETCH MAP)
TANK
GOMAL R.
GOMAL SITES
DERA ISMAIL KHAN
ZHOB R.
PERIANO GHUNDAI
JHELUM R.
CHENAB R.
MANDA
BEAS R.
RAVI R.
JHANG
SUTLEJ R.
RUPAR
SHORKOT
KAMALIA
HARAPPA
C.B.S.
PAKPATTAN
VAINIWAL
LORALAI R.
QUETTA
DABARKOT
DERA GHAZI KHAN
MULTAN
FORT MUNRO
KALIBANGAN
SIBI
RAKHI GARHI
MITATHAL
PATHIANI KOT
JUDEIRJODARO
JACOBABAD
MULA R.
SHIKARPUR
LARKHANA
MOHENJODARO
KOT DIJI
LOHUMJODARO
CHANHUDARO
HAB R.
MALI R.
GARHO BHIRO
KEY
ROUTES
DENSELY SETTLED AREA
ANCIENT SITE
MODERN SITE
MOUNTAIN

Fig. 23. 1. Sketch map of the Indus Plains.

(Bharadwaj 1961: 157).[2] Harappa appears to have been located to the north of the zone of high agricultural productivity, and near the southern limits of the pastoral region.[3]

What could have been the factors which influenced the location of Harappa? It is not surprising that the central place theory does not explain spatial relationships in the Harappan Period since it is predicated on the predominance of rural marketing in situations where demand is diffused uniformly over the region and where perfect competition is assumed. An alternative model is the "gateway city." This is a part of a settlement system characterized not by centrality and the interstitial placing of sites, but by dendritic networks where lower level centers are tributary to only one higher level center—not to more than one as in central place systems. With primate cities functioning as "gateways" the networks connecting the settlement points are like elongated fans radiating from the primate city. The points are linked to the latter, rather than to each other except along routes. Such systems are connected with long distance trade and bulk shipment rather than with local exchange or retail networks. This is especially true in regions where the economy has a strong external orientation. The primate city sees the convergence of commodity flows, and functions as a redistributive or wholesaling center as the case may be. In such a system the primate city is located at a point where it can control the movements of goods: at a break of bulk point, at an important river crossing, or at the junction of several natural routes. It forms the major link between the core territory and the peripheral region or external world. (See Burghardt 1971; Smith 1976; Kelley 1976; Hirth 1978.)

If Harappa functioned as a gateway city, rather than as a central place, one would expect that transportation functions and facilities would outweigh the importance of manufactures there. It is very difficult to glean information from the excavation report regarding manufacturing at Harappa—other than the presence of sixteen furnaces on Mound F. In contrast, Mohenjodaro has evidence for the manufacture of pottery, copper/bronze, gold ornaments, and agate beads. Ivory carving, shell working and possibly textile dyeing are also attested.

It is significant that several routes of historical importance converge on Harappa. The rivers of the Indus system provide natural waterways and routes of communication from the Himalayan region to the plains. Traffic between the mountains to the west and the upper plains has traditionally flowed through Dera Ismail Khan and Dera Ghazi Khan. Multan, a frontier city of the medieval period, is connected to both places by good routes; the Chenab being fordable in its vicinity. Routes move up the Ravi from Multan to Harappa, and thence some 60 kilometers southeast to Pakpattan. This has been the traditional ferry point on the Sutlej for centuries, and is an important stage on routes connecting the Punjab with the Sarasvati Valley. Alternately, a winter caravan route has traditionally moved from Dera Ismail Khan to Jhang, Kamalia, Harappa, Pakpattan and thence to Delhi (Gazetteer of Montgomery District 1884: 147-48, 184-85).

Thus, Harappa is in a situation of maximum advantage for procuring goods from the mountain zones west, northwest and northeast of the upper Indus plains. Consider also the existence of Harappan settlements in the Gomal Valley, at Manda near Akhnoor, where the Chenab becomes navigable, and at Ropar (Rupar) on the Sutlej at the foot of the Siwaliks, just a few miles below the point where that river becomes navigable. One may thus imagine a dendritic fan with its apex at Harappa. This fan spreads out from northwest to northeast, and in turn feeds the core Harappan regions in the lower Sarasvati and Sind.

The materials known at the Harappan sites that could have been procured along this network would include lapis lazuli from Badakhshan (via the Gomal Valley), deodar wood from the Himalayan temperate forests, pine wood from the Himalayan ranges east of Kashmir, elm wood from the subtropical Himalayas east of Dehra Dun, copper and steatite from the Zhob Valley (Mughal 1970: 194), placer gold from the upper reaches of the Chenab, and perhaps copper from scattered deposits in the Simla and Kangra regions.

More detailed work is necessary for the substantiation of this hypothesis, and it should be noted that the paucity of sites in the vicinity of Harappa may be a factor of chance survival or discovery. If, however, this hypothesis is correct it will indicate that at least at Harappa, the processes of urban growth were related less to increasing rural productivity and the proliferation of local exchange systems than to redistributional mechanisms and an external trade orientation. That the Harappans exported several kinds of goods to Mesopotamia is well known. What needs greater emphasis is the fact that many of these goods were not local products in the strictest sense, but were procured from regions outside the Indus plains.

Harappa is an obvious case, but if this hypothesis is to stand one will need to consider the possibility that Judeirjodaro and Rakhigarhi, relatively large Harappan settlements located near the peripheries of the settled plains, also functioned as "gateway cities" though on a smaller scale.

NOTES

[1] The location of Shikarpur, an important town of Sind in the historical period, perhaps provides an analogy to the location of Mohenjodaro.

[2] To the best of my knowledge southwestern Punjab to the west of the Sutlej was not settled by the Painted Gray Ware producing people either.

[3] Harappa lies near the 25 centimeter isohyet (Naqvi and Rahamatullah 1962; Almad 1963) which crosses lower Punjab approximately west to east. It would be useful to know what that isohyet signifies in terms of the original forest cover and the problems of land clearance. I am grateful to Marcia Fentress for bringing this fact to my attention.

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DILIP K. CHAKRABARTI

24. 'Long Barrel-Cylinder' Beads and the Issue of Pre-Sargonic Contact between the Harappan Civilization and Mesopotamia

Ernest Mackay has discussed and illustrated long barrel-cylinder beads from both Mohenjodaro and Chanhudaro (see Table 24.1, Fig. 24.1 and Pl. 24.2). There is also a mention of these beads in H.C. Beck's report (1940) on selected beads from Harappa. Because of the lack of suitable publications it is difficult to locate this bead type at other excavated Harappan sites. But even on the basis of its occurrence at Mohenjodaro, Chanhudaro and Harappa it may be said that this is a distinct Indus bead type, as distinctive in its own way as the etched carnelian beads. And unlike the latter, which are also known to occur in later Indian historic contexts, this bead type died with the Indus Civilization.

This type has been found in various stages of manufacture at Chanhudaro. Apart from carnelian it is also known in pottery, often with a red slip. The specimens in pottery are obviously poor men's imitation of the carnelian variety. There is also at least one specimen from Mohenjodaro in a dark green chalcedony called plasma. Similar specimens have not been reported from Chanhudaro or Harappa.

Table 24.1. Long barrel-cylinder beads at Harappan sites

Mohenjodaro	
Mackay 1931: 511-12	Pl. CXLV, 24-32 Pl. CLI, b
Mackay 1938: 512-13	Pl. LXXXII, 9-10 Pl. CXI, 32, 40 Pl. CXXXVI, 9, 17 Pl. CXXXIX, 65, 72, 78 (see Fig. 24.1) Pl. CXXXVIII, 20 Pl. CXXXVII, 47 (see Fig. 24.1)
Chanhudaro	
Mackay 1943: 203-204	Pl. XCIII, 14
Boston Museum of Fine Arts	36.1507 and 36.1564 (see Pl. 24.1)
Harappa	
Beck 1940: 400	Pl. CXXXI, 2a, b

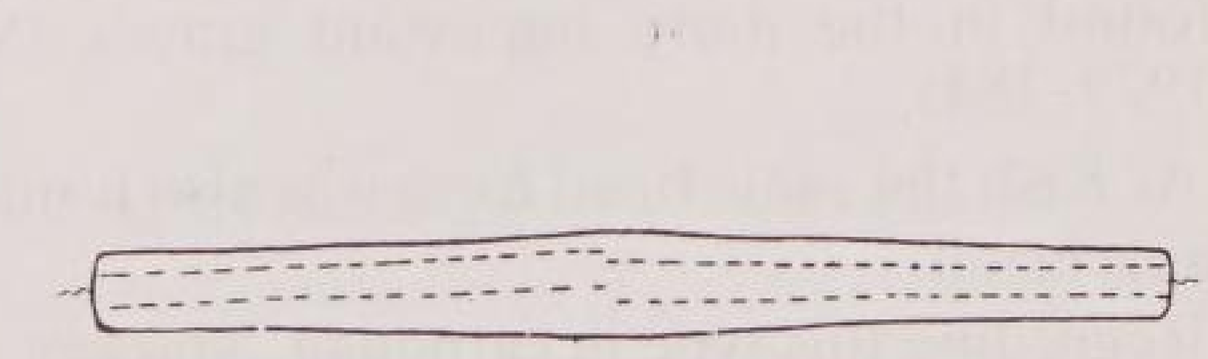

Fig. 24.1. Long barrel-cylinder beads from Mohenjodaro. From top to bottom: Mackay 1938: Pl. CXXXIX, nos. 65. 72, 78 and Pl. CXXXVII, no. 47. Scale: ca. 1:1.

The carnelian variety is discussed in the present context. These beads are long, being anything from about two to three inches. Ernest Mackay aptly christened the type as "long barrel-cylinder." The distinctive feature is a barrel-like swelling in the middle. The west Asiatic significance of this bead-type was first noticed by Mackay himself.

> This type of bead is of unusual interest, as similar beads found at Kish have been dated to the pre-Sargonic period. As, however, beads of this type were uncommon in early Mesopotamia and fairly plentiful at Mohenjodaro, in both the Late and Intermediate periods, there is reason to think that they were made in India and exported to Mesopotamia. They have apparently not been found in Elam (Mackay 1931: 511-12).

It was Beck (1940: 400) who drew attention to this after Mackay. In the Harappa collection he noticed two "very interesting" exceptionally long barrel beads of carnelian. He wrote:

> These beads are exactly similar in shape to some from Mesopotamia; but the latter are shorter, rarely exceeding two inches in length, whilst no. 129 from Harappa must have been over three-and-a-half inches long and some from Mohenjo-daro are over five inches long. Sir Leonard Woolley, however, states that a very few similar beads from Ur are nearly four inches long.

It is somewhat curious that the significance of this bead-type as a possible item in the Indus-West Asia contact has been subsequently ignored.

The Kish analogies of this bead-type suggested by Mackay were reported in his own report in 1929.

> A favourite shape for carnelian beads is the long one shown on either side of the decorated bead in Pl. XLIII, no. 9. These beads, 5.50 and 4.90 cm in length, are beautifully made and finished. The boring of their holes, which was performed from both ends, is extremely well done. Similar beads were found in burial 51.... They also occur in necklaces from other burials, but the longer ones are on the whole rather rare, and are only to be found in the more important graves (Mackay 1929: 184).

At Kish the same bead form was also found made of lapis lazuli.

Regarding this type in carnelian, Mackay went to the extent of asserting that he regarded these carnelian beads as important from the point of view of dating Mohenjodaro. "They seem not to have been worn in Babylonia later than ca. 2700 B.C. and are also unknown in India, as far as one can ascertain, except in the Indus Valley Civilization" (Mackay 1931: 511, note 2).

It may be noted that this carnelian bead type occurs along with etched carnelian beads at Kish. Regarding these etched beads a recent researcher is of the opinion that they are found in Cemetery A and do not seem to have been imported after Early Dynastic IIIB (During Caspers 1971: 88).[1] Obviously this chronological range should apply as well to the long barrel-cylinder carnelian beads at this site and there is seemingly no doubt about Mackay's Pre-Sargonic dating of this bead type there.

The Pre-Sargonic chronology for this Indus bead type is also confirmed by its presence in the Royal Graves at Ur. It is clear from Beck's statement cited earlier that Woolley found "a very few similar beads from Ur." It has not been possible to locate them in Woolley's publications on Ur, but a study of the Beck collection in the Haddon Museum, Cambridge leaves no doubt of their occurrence in the Royal Graves. There are four unmistakably Indus long barrel-cylinder carnelian beads in that collection. The museum record on them is not detailed but is clear enough for one's purpose:

No. 47.2215 B: one specimen. There is no detailed record except that it is from the Royal Graves at Ur. 1933-34 is noted as the excavation season.

No. 47.2116: two specimens. There is no specific record except that they are from Ur. The year mentioned is 1927-28.

No. 48.2411: one specimen. It is supposed to be from the "Early Sumerian" Period at Ur. The year noted is 1928-29.

In the University Museum, Philadelphia, there are at least four carnelian beads of this type, apart from three more similar beads of an unidentified material (Pl. 24.2).

Museum no. 30-12-566: three specimens. The author could not identify the very dark green stone used for these beads (Pl. 24.2a).

Museum no. 30-12-567: one specimen. Carnelian (Pl. 24.2b).

Museum no. 32-40-227: two specimens; one complete, one broken. Carnelian (Pl. 24.2c).

Expedition no. U 17745: one specimen. Carnelian.

The Museum records for these beads indicate that they belong to the Akkadian graves at Ur. Those with museum numbers 30-12-566 and 30-12-567 are from private grave 1422 which has been dated by Buchanan

(1954) to the Post-Akkadian Period. Maxwell-Hyslop (1974: 67, Pl. 48a, c) in her study of West Asian jewelry has illustrated four of these specimens (University Museum nos. 30-12-566, 567) and she has put them under "the Guti-Gudea period, Third Dynasty of Ur to the Isin-Larsa Dynasties, 2250-1894 B.C." (Maxwell-Hyslop 1974: 67). In any case, if our study is correct, the carnelian long barrel-cylinder beads were known at Ur from the Pre-Sargonic Period to the Akkadian or even the Isin-Larsa Period.

There are two additional sites of interest outside Mesopotamia: Susa and Jalalabad. The occurrence of long barrel-cylinder carnelian beads at these sites has been reported (Chakrabarti and Moghadam 1977). The specimens are housed in the Tehran Museum. There is only one specimen from Susa (Tehran Museum necklace no. 11726). There are three complete specimens and two broken ones from Jalalabad (Tehran Museum necklace nos. 26040 and 26036). The museum record only mentions the sites from where these specimens came. The material from Jalalabad, which also contains etched carnelian beads, is a part of the surface collection. As far as one could ascertain, there is only one published reference to a site called Jalalabad in Iran. It is near Persepolis and is shown as number 32 on Paul Gotch's survey of Bakun A5 sites on the Fars Plain (Gotch 1971: Fig. 1). Bakun A5 Ware is supposed to continue up to the middle of the third millennium B.C., and thus the Harappan contact at the site is not surprising. Incidentally, this evidence of interaction, in the form of two types of Indus beads (etched carnelian and long barrel-cylinder carnelian) at Jalalabad is particularly significant because the route between Tepe Yahya and Susa, two well-known points of Indus contact in southern Iran, must have passed along the Fars Plain. It would be well worth a visit for those interested in the Indus-West Asia relationships to explore this site.

There are thus four sites in West Asia with Indus long barrel-cylinder carnelian beads: Kish, Ur, Jalalabad and Susa. Each of these sites has also produced etched carnelian beads. At both Ur and Kish the earliest occurrence of this bead type is Pre-Sargonic which is the earliest context for etched carnelian beads. The long barrel-cylinder carnelian beads are thus one of the earliest pieces of evidence for Indus-Mesopotamia contact, and Mackay's original postulate seems to be amply vindicated.

At this point I want to recount the basic evidence for Pre-Sargonic contact between the Harappan Civilization and Mesopotamia. The purpose of this exercise will be directed toward corroborating the evidence furnished by the etched and long barrel-cylinder carnelian beads for Pre-Sargonic interaction. A piece of evidence which immediately comes to mind is the steatite/chlorite vessel-fragment from the lower levels of Mohenjodaro. This belongs to an intercultural style of vessels which, as P. Kohl has demonstrated, are "best dated to the end of Early Dynastic II-Early Dynastic IIIA" (Kohl 1974: 271). There are two more steatite/chlorite pieces which were reported from Tell Agrab in the Diyala region Mesopotamia by Henry Frankfort in 1936 and 1937 (Frankfort 1936, 1937). These have been generally ignored in the recent literature on the subject. For instance, none of the three recent bibliographies of the Indus Civilization even mentions these publications by Frankfort (Pande and Ramachandran 1971; Brunswig 1973; Possehl 1979). In his first report on Tell Agrab in 1936 Frankfort published two fragments of a steatite vase belonging to the Early Dynastic Period. Frankfort writes:

> While the human figure on the one fragment is purely Mesopotamian, the scene on the other hand is as certainly alien to Sumerian art and religion. This shows the building in front of which the figure is seated. The facade is mostly lost, but just connects the two sherds. Inside the building we see a large humped bull standing in front of a manger. Now, the wild ox and the water buffalo were indigenous to Mesopotamia: the humped bull was not. Moreover, no scene which could be interpreted as a rendering of animal worship is known in Mesopotamia. We find in an entirely Mesopotamian setting the rendering of an Indian cult.

Gordon Childe (1964: 170) subsequently wrote that the style of the vase could be used to date it to Early Dynastic III. He also accepted the Indus significance suggested by Frankfort. Another authority who agrees with Frankfort's conclusion on this point is Max Mallowan (1965: 22).

In 1937 Frankfort reported a painted pot from Tell Agrab which also belonged to the Early Dynastic period and confirmed, according to him, the evidence of the stone vase found in the previous season. The painted frieze on the pot shows:

> A bull tethered inside a building, and it is difficult not to connect the three female figures, who seem to be beating cymbals or tambourines with some ceremony of worship, the central feature of which

> is the bull.... Neither the texts nor other monuments have so far supplied us with evidence about this curious feature, which is shown, by the seals from Mohenjodaro and Harappa, to have been quite usual in India.

It is possible to argue that the evidence cited by Frankfort is not conclusive; but when viewed in the total context of the Pre-Sargonic occurrence of etched and long barrel-cylinder carnelian beads and the intercultural style vessel fragment from the lower levels of Mohenjodaro, this evidence from Tell Agrab makes good sense. Incidentally, the design of a bull seated in front of a temple facade is a common enough motif on ritual metal vessels sold in Hindu pilgrim centers even today.

Another piece of evidence may be interesting in the present context. This was published by Charles Fabri (1937). He reported a short (only three signs) inscription on a vessel from Mohenjodaro. These signs do not obviously resemble any of the signs of the Indus script. Fabri did, however, find them in Mercer's *Sumero-Babylonian Sign List.* The identifications (and Fabri's translation) were sent to, and endorsed by, Franz M. Th. Bohl who is mentioned by Fabri as "the world-famous Assyriologist of Lyden University." Fabri's translation need not concern one here, but what is significant in the present context is Fabri's suggestion that the shape of characters indicates that they "cannot be older than 2800 (B.C.) by any means, and that it is much more likely that it belongs to a period not far removed from 2500 B.C." As far as one can determine, this publication and opinion of Fabri have not been subject to close scrutiny.[2]

Finally, in view of all this evidence the so-called Pre-Sargonic rectangular seal with a bull and an inscription in three or four signs, found virtually on the surface at Ur (Gadd 1932: 3) merits some attention. According to Gadd the signs "are in any case pre-Sargonic" (Gadd 1932: 4). There is, however, nothing specifically Indus about the seal except the bull and the distinctive rectangular shape. It is possible to agree with Gadd that this may be an adaptation from the Harappan type either at Ur or at a place "under the influence both of the Indus and of the Sumerian civilization" (Gadd 1932: 5). The point to note is the Pre-Sargonic character of the signs along with the rectangular shape of the seal which is alien to the Mesopotamian repertoire. There is another rectangular seal (bearing only a scorpion and a sign of writing) from Private Grave no. 791 in the Royal Cemetery at Ur (Woolley 1934: 568, Pl. 192). This grave, according to Woolley, is "clearly dated by external evidence to the time of Shub-ad" (1934: 568).

To sum up, with the long barrel-cylinder carnelian beads as a starting point the present paper has tried to underline different pieces of the evidence for Pre-Sargonic Indus-Mesopotamia contact. The primary data, as noted, belong to three categories: long barrel-cylinder and etched carnelian beads and the steatite/chlorite vessel fragment with mat or basket weave from the lower levels of Mohenjodaro. Attention has also been drawn to Frankfort's, Childe's and Mallowan's opinions on the Indus character of the Early Dynastic vase from Agrab. This vase has however been treated by Kohl as a part of the intercultural style vessels with "figure" motifs. He is doubtful of the Indian characterization of the humped bull: "Today the bulls of the Soghun valley are humped, and it may be possible to prove that they existed at Tepe Yahya as early as its initial occupation" (Kohl 1974: 168). However, as has been emphasized, what makes this vase (and the Tell Agrab painted pot) interesting is not merely the humped bull but also the general composition with the suggestion of a religious association which recalls India.

No inference can yet be made from Fabri's "Sumero-Babylonian" inscription from the Mohenjodaro jar; but surely this publication deserves far more careful scrutiny than it has been accorded so far. Finally, two rectangular seals in Pre-Sargonic context have been discussed for the simple reason that the rectangular shape in itself suggests the Harappan Civilization.

One may note in conclusion that the basic theoretical significance of Pre-Sargonic contact between the Harappan Civilization and Mesopotamia is that it makes it possible to visualize the growth of urbanization in India at virtually the same time as Sumer.

NOTES

[1] During Caspers' comparison of a small stone head from a presumably Harappan level of Dabar Kot with an Early Dynastic Sumerian sculpture from the Diyala Valley (During Caspers 1963) is suggestive of a Pre-Sargonic contact between the Indus Valley and Mesopotamia. This stylistic argument is interesting, but cannot be treated as conclusive given the nature of the evidence from Dabar Kot and our general knowledge of Baluchistan at this time.

[2] The present author sought the opinion of J.V. Kinnier-Wilson in this matter. He disagreed with Fabri's suggestion of "Sumero-Babylonian" affinity for these signs. But, the signs do not seem to be purely Harappan and considering that Fabri had the backing of a professional Assyriologist the issue is perhaps deserving of a review from both sides at this time.

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SHASHI ASTHANA

25. Harappan Trade in Metals and Minerals: A Regional Approach

THE Harappans, like the Sumerians, made many articles fashioned from a variety of metals and minerals including semiprecious stones. The area most closely identified with the Harappan Civilization is, however, nearly devoid of these products which seem to have been so essential to the functioning of this urban system. Thus the Harappans, once again like the Sumerians, were involved in a complex trading system which allowed them access to these metals and minerals and the means for their internal distribution. The primary sources for the products under discussion appear to have been Baluchistan, Afghanistan, Iran, Soviet Central Asia, the lands bordering the Persian Gulf as well as interior, peninsular India (Fig. 25.1). Products such as lapis lazuli, chlorite/steatite and turquoise have already been discussed in detail as individual components of this commerce (e.g., Herrmann 1966, 1968; Kohl 1975, 1976; Tosi 1974). But to the best of my knowledge no integrated picture of the Harappan exploitation and trade in metals and minerals has yet been attempted. It is hoped that this paper will make some progress in this direction by highlighting two important aspects: (1) the extent to which the Harappans exploited these resources directly and/or indirectly, and (2) the extent to which archaeological remains outside the Harappan Culture area help in visualizing the pattern of natural resource exploitation and trade.

These aspects are dealt with in the framework developed elsewhere (Asthana 1979a: 31-47). There it has been shown that two major units of trade[1]—production and distribution—were used by the Harappans to strengthen their commerce. The production unit, which procured raw materials from neighboring areas or distant places, worked for the distribution unit which serviced outside markets.

There is a frustrating paucity of published geological and mineralogical information on Iran, Afghanistan, Pakistan, and neighboring countries. Nevertheless, the known source areas for the metals and semiprecious stones which have been found at Harappan sites, (e.g., lapis lazuli, turquoise, steatite/chlorite, carnelian, gold, silver, lead, copper and tin) have been plotted. In the process it has been shown that the exploitation pattern was essentially regional. The distribution pattern of rare minerals and metals was centralized, however, since their procurement could not be diffused.

SEMIPRECIOUS STONE

Lapis Lazuli

Lapis lazuli was in great demand in Mesopotamia where it was used for personal adornment and for the decoration of temples. It was also prized by the Harappans. This stone is first documented during the Pre- and Early Harappan times and it continued to be used through the Late Harappan Period. Beads of lapis lazuli have been found in Baluchistan at Nal (Hargraves 1929: 34, 43), Kulli (Stein 1931: 123), Mehi (Stein 1931: 158) and Shahi Tump (Stein 1931: 96). In the greater Indus Valley, Rahman Dheri (Durrani 1977), Sarai Khola (Halim 1972a, 1972b), Jalilpur (Mughal 1974: 112), Gumla (Dani 1970-71: 86), Amri (Casal 1964: 154-55), Pandi Wahi (Majumdar 1934: 13), Jhukar (Majumdar 1934: 13),

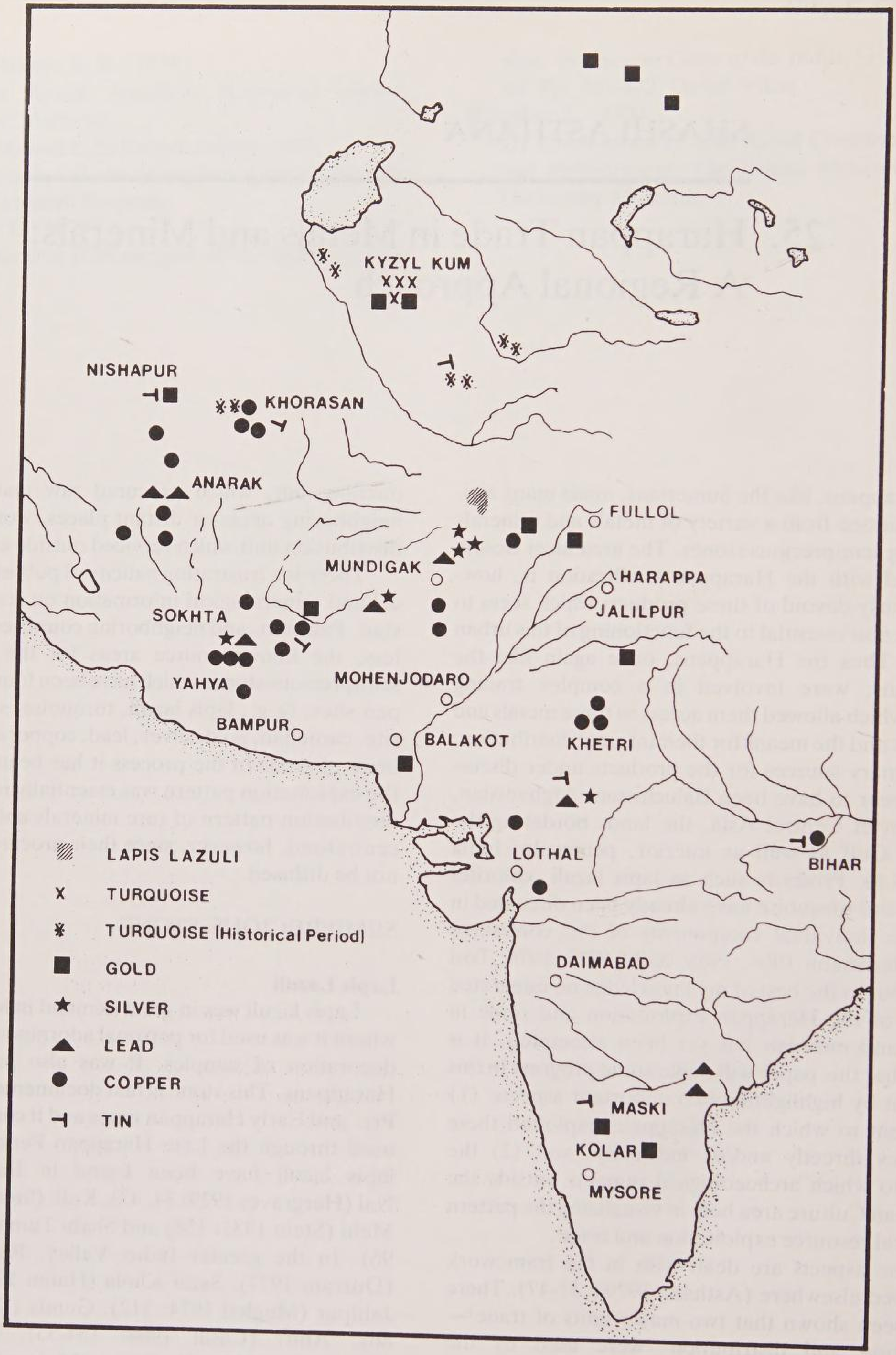
KYZYL KUM
NISHAPUR
KHORASAN
ANARAK
FULLOL
MUNDIGAK
HARAPPA
SOKHTA
JALILPUR
MOHENJODARO
YAHYA
BAMPUR
BALAKOT
KHETRI
LOTHAL
BIHAR
DAIMABAD
MASKI
KOLAR
MYSORE
▨ LAPIS LAZULI
X TURQUOISE
⁑ TURQUOISE (Historical Period)
■ GOLD
★ SILVER
▲ LEAD
● COPPER
⊣ TIN

Fig. 25. 1. Harappan sources of metals and minerals.

Mohenjodaro (Marshall 1931: 542-43, 571), Chanhudaro (Mackay 1943: 203, 207, 209; Majumdar, 1934: 40), Harappa (Vats 1940: 59, 403, 413, 441) and Balakot (Dales 1979b: 50) have yielded the lapis lazuli beads. Lapis beads and pendants were found in limited quantities at Kalibangan (Chakrabarti 1978: 53) in Rajasthan, Lothal in Gujarat (Rao 1973: 102), Surkotada in Kutch (Joshi unpublished) and Banawali (Bisht 1978: 88) in Haryana. The trading importance of lapis lazuli cannot be denied since it has been found on all the important excavated Harappan sites, beginning from the Pre-Harappan times.

The source areas for this semiprecious stone are eastern Siberia—the Pamirs and an area near Lake Baikal (Webster, 1975: 219-22); Afghanistan—Badakshan (Herrmann 1968) and a few hypothetical Iranian and Indian sources (Chakrabarti 1978). The eastern Siberian sources do not produce as fine a quality of stone as the one used by the Harappans. Further, these sources were probably beyond the practical reach of the Harappans due to the great distances. The Iranian and Indian sources are known to us only from literary documents and have not been confirmed by geological survey. Thus, while the Iranian literary sources locate lapis mines in Mazanderan and Dizmar in Azerbaijan as well as Kirman (Hamd-Allah Mustawfi of Qazvin 1919: 197), the geological survey reports are absolutely silent on the subject. The well-known mines of Afghanistan are thus the most likely sources. These are located in the Kerano Munjan District of Badakshan Province in the Hindu Kush (Herrmann 1968: 21-57). This is an inhospitable country of bare mountains and deep ravines. A group of four mines is situated in the Kerano Munjan Valley, altitudes ranging between 2000 and 5500 meters (Herrmann 1968: 22):

1) Chilmak
2) Shaga-Darra-i-Robat-i-Paskaran
3) Stormy
4) Sar-i-Sang

In 1964 an Oxford University expedition examined these ancient works (Herrmann 1968: 24) and found that Sar-i-Sang is the only mine which is in use today. Unfortunately no remains of the Protohistoric Period were found during this visit. These settlements were perhaps washed away by the eroding river just as happened to a recently abandoned village called Lajvar Shui. In any case the lapis from these mines could easily have been taken on tracks to the north or south, following the course of the Kokcha River.

It is a reasonably established fact that Badakshan was supplying lapis lazuli to the whole of West and South Asia. Discovery of the Harappan trading posts at Shortugai, near Ai-Khanum in Afghanistan (Lyonnet 1977) indicates that the Harappans were present in this region and were familiar with this source. Still, the limited quantity of lapis objects at Harappan settlements poses a peculiar problem. If the Harappans were exploiting this source why aren't there more lapis objects at their settlements? It appears that during the Pre-Harappan times the lapis trade was in other hands, possibly the people of Shahr-i Sokhta, and when the Harappans came, they took over (Gupta 1979). Archaeological evidence at Sokhta also shows that by 2300 B.C. the trade in lapis had declined considerably there. This is possibly a reflection of Harappan activity. Cuneiform texts from Mesopotamia (Leemans 1960), which list lapis as one of the commodities coming from Meluhha, further affirm the contention that the Harappans were fully involved in the lapis trade. They may even have been the main suppliers. They probably brought this material up the Makran Coast to Sutkagendor and shipped it from there to Mesopotamia, and places like Shahdad in Kirman (Asthana 1979b). To reach Shahdad they may have used the Bampur Valley and the Kirman gap. Thus, the Harappans appear to have been the primary exporters, and not the consumers, of lapis and lapis objects, and this is the reason that Harappan towns have yielded the stone, but not in an appreciable quantity. This view is somewhat at variance with that held by Chakrabarti (1978) and others.

Turquoise

Only a few Harappan sites have yielded turquoise, and it does not appear to have been a very popular item with them. It is not found in India though there are literary sources of the historical period which state that it could be found in the Ajmer Hills of Rajputana. Mohenjodaro (Marshall 1931: 523, 525) Rahman Dheri (Durrani 1977) and Mehrgarh (Jarrige and Lechevallier 1979) are so far the only sites to have yielded turquoise and these were just a few in the form of beads. This may indicate that the Harappans obtained the finished beads and not the raw material. In other words, turquoise may not have figured as an item in organized trade.

Turquoise comes from the mountainous territory of the inner Kyzyl Kum and the mountains of Ilak (Karamazar) in ancient Khodjent (Leninabad), located along the upper reaches of the Syr Darya in Soviet Central Asia (Tosi 1974). According to Hole and Flannery (1968: 179) and Wright (1969: 55) during prehistoric times turquoise came from the well-known sources near Nishapur in Iran. Several deposits have also been reported between Kirman and Yazd and there is evidence of early working at these sites (Pogue 1915: 40). Literary sources also attest this. According to Pliny (Book XXXVII, Chap. 33) Carmania was a source of callaina (turquoise). Marco Polo also mentions the presence of turquoise in Kirman (Sykes 1902: 265). It is thus somewhat puzzling that with turquoise so amply available in Iran the Harappan towns did not make more extensive use of it.

As the evidence stands to date Mehrgarh VI has yielded a few turquoise beads (Jarrige and Lechevallier 1979) along with those of lapis lazuli. The beads appear to have come to the site in finished form. Shahr-i Sokhta II (Tosi 1974: 147-62) has evidence for a workshop for lapis and turquoise as does Mundigak III (Jarrige and Lechevallier 1979). It is thus possible that Mehrgarh got its turquoise beads from Shahr-i Sokhta or Mundigak. The turquoise beads at Mohenjodaro could have come from either of these sources, but Mundigak is possibly the more likely since it was in regular contact with the Harappans as is evident from several objects of Harappan type that were found there. Sokhta may also have been the source for at least some of the turquoise beads but unfortunately nothing tangible has yet come from this site which could establish Sokhta-Harappan interaction.

Steatite/Chlorite

Alabaster, carnelian and steatite/chlorite are not very useful commodities for the study of trade because they are relatively widely found in Iran, Pakistan, India and Saudi Arabia. The extensive use of steatite for making vases, seals, beads, figurines and decorative objects found on almost all Indus sites suggests that there was a regular supply of this material to Harappan cities. It also indicates that the stone was readily available in the neighboring regions. A number of sources have been reported in North Gujarat (Rao 1973: 116) at Devni Mori, Kundol, Lokha and Mora; although there is no proof of their being in use during prehistoric times. Marshall (1931: 678) reported a number of sources in Rajasthan, such as at Dogetha, Gisgarh and Morra and he suggested that these were the Harappan sources. Rao (1973: 116) however, suggests that Karnataka might have supplied this material to the Indus people via the contemporary Neolithic people of the Deccan. In return they may have obtained copper tools and steatite disc beads. To support his theory he uses two points: (1) the disc beads of burnt steatite found at the Chalcolithic/Neolithic sites of the Karnataka/Andhra region are identical to Harappan wafer beads, and (2) the occurrence of parallel-sided stone blades and evolved Harappan ceramic types in a form of Black and Red Ware at Singanapalli, Pusalapadu, etc., in Kurnool District may indicate interaction.

Another promising steatite source is in northern Baluchistan and the adjoining areas. The Zhob District has two localities, the largest of which occurs about 50 kilometers north of Fort Sandeman (Pithawala 1952: 202). There is evidence that these were mined in the ancient past. Chlorite is available in the Kirman region of Iran, near the Soghun Valley (Kohl 1976: 74) and also in western Saudi Arabia (Goldsmith 1971: 54).

The most important objects made of steatite/chlorite are stone vases like those found from Mari to the Indus. The exact places of production of these objects and the sources of raw material are imperfectly known; however there is at least one major workshop at Tepe Yahya in the Soghun Valley which is very rich in this raw material. From this evidence it is clear that some chlorite was mined in the southern part of Iran and vases of this material were made at Yahya and supplied to areas both east and west. But the typological studies of these vases and scientific analysis of the raw material made by Philip Kohl (1975: 30) indicate the existence of workshops other than Yahya and sources other than the Kirman mines. The two fragments of four-compartmented vessels showing a zigzag pattern, which were found at Mohenjodaro (Marshall 1931: 36-37, Pl. CXXXI) have no parallels at Yahya but they do have at Shahdad (Hakemi 1972: Pl. XIVa, b). The latter site may have been the workshop which can only be confirmed by further excavation there. Scientific analysis (Kohl 1975: 30) further shows that the stone was obtained from several sources and not from Kirman alone. It has been proved beyond doubt that the Sumerian chlorite is different from that at Yahya. The former is closer to the material coming from farther east and there is some possibility that the Sumerians obtained their steatite/chlorite via trade from the sources in Baluchistan. But at the same time the Harappans appear to have been very much aware of the Kirman sources and the workshops at Yahya and Shahdad. This is evident from the two compartmented vessels at Mohenjodaro and etched carnelian beads at Shahdad (Kohl, personal examination) and Yahya as well as the Harappan characters on a potsherd from Yahya (Lamberg-Karlovsky 1970; Lamberg-Karlovsky and Tosi 1973; Asthana 1979b).

Carnelian

The use of carnelian for beads and pendants was fairly common amongst the Harappans. Almost all Indus sites have yielded carnelian beads in a variety of forms. Of them, those of etched carnelian are worth particular note since they crossed the borders of India to reach Mesopotamia and Iran (Susa, Shahdad, Yahya). This stone is widely available in India. There are a number of sources in Madhya Pradesh, Rajasthan, etc., but the main deposit for the Harappans appears to be in Kathiawad at Rajpipla near the village of Ratanpur (Marshall 1931: 681). There are also Harappan sites near this place. The only well-known Iranian carnelian source is in the dry branches of the Helmand River in Seistan near Shahr-i Sokhta (Tosi 1969: 374). The absence of any Harappan remains in the Seistan area (of course only at the present showing) makes it difficult to assess the possible Harappan knowledge of this source.

A cylinder seal of Gudea of Lagash refers to bright carnelian, copper, tin and lapis lazuli coming from Meluhha (Leemans 1960). If Meluhha can be taken as the area of the Harappan Civilization, then it was exporting carnelian, probably by exploiting Indian sources. But other mines may have been involved as well. The discovery of etched carnelian beads at Mesopotamian and Iranian sites (Susa, Shahdad and Tepe Yahya) demonstrates, however, that carnelian beads were in demand in the West Asian markets (During Caspers 1971: 205-76; Asthana 1979a, 1979b).

METALS

By Harappan times metallurgy was a refined technique. Gold, silver, copper, tin and lead were all available to Harappan smiths.

Gold

Gold objects and ornaments have been found at Mohenjodaro, Harappa, Lothal, Kalibangan, Banawali, Rahman Dheri, etc. Gold is widely distributed in India. A majority of Indian rivers have gold in their sands, although only in very small amounts when washed (Marshall 1931: 674). South India is, however, very rich in gold with mines located in Anantpur, Coimbatore, (Hadabanatta, Kavudahalli and near Porsegaundanpalayan) and Wynaad (Marshall 1931: 674). In Karnataka old mining areas are numerous and the Kolar mines are still famous for their gold. According to Marshall, the Kolar mines may have supplied gold to the Harappans (Marshall, 1931: 674). This view is also held by Rao (1973: 116).

Iran, Afghanistan and Soviet Central Asia also have several important gold sources which may have supplied Harappan demand. Literary sources give some clues to these ancient deposits. Strabo refers to the River Hyktanis in Carmania as a source of gold and an Assyrian inscription indicates the presence of gold in Kawend (Media) (Forbes 1971: 165). The other important deposits which do not have reference in the texts (Forbes 1971: 166), are the one near Damghan; another between Nishapur and Meshad; a third, about three kilometers east of Meshad in the Tiran mountains; a fourth, west of Isphan near Hamadan; a fifth, in the region of southeast of Tehran; and finally, the one in the northwest of the Takht-i Suleiman. But Afghanistan may also have provided some gold to the Harappans. It is found in small quantities near Kandahar. So also does it come from the north side of the Hindu Kush. The other sources are the streams draining the Kuh-i-Baba, the streams in Kohistan and above Laghman and Kunar (Marshall 1931: 674). However, the richer sources lie in Soviet Central Asia. South of the Caucasus, in Armenia, the famous metal workers, the Chalybes, are credited with rich mines. This probably means the deposits near the Taldjen River, close to Artwin. Other traditional gold bearing areas are the Urals, Siberia and the Far East. Gold is washed in many places in the Karakoram and in the beds of a number of rivers of Central Asia. The Muruntau mountains in the Kyzyl Kum desert has the largest deposit of gold (Forbes 1971: 166; Kalesnik and Pavlenko 1976: 202).

Today the Soviet Union is a major supplier of gold to the world market and it probably played the same role in the remote past. The discovery of the famous Fullol Hoard in the Hindu Kush of northern Afghanistan (Tosi and Waradak 1972: 9-17) contained a number of gold objects with Mesopotamian and South Turkmenian motifs. This proves that the region (the Oxus basin—northern Hindu Kush) was as important to the Middle East for gold as it was for lapis lazuli. Incidentally, the Harappan trading posts at Shortugai are also in the same region (Francfort and Potter 1978: 29). Harappan contacts with Central Asia are now beyond doubt especially after the discovery of: (1) a few Harappan pottery types in Namazga V sites, (2) a Harappan inscribed seal at Altin Depe, (3) comparable ivory objects at Altin Depe, and (4) a close similarity in a few copper artifacts (Gupta 1979: Vol. 2). Thus, the role of Shortugai as transit camp is made self evident. The Harappans were evidently supplying ivory to Central Asians, either as raw material or in the form of finished goods. What is important to infer is what the Harappans got in return. It may have been gold.

Silver and Lead

Silver was another important metal known to the Harappans. It was apparently quite popular with the Harappans living at Mohenjodaro and Harappa, but those at Lothal and Kalibangan rarely used it. Silver was used for making vases and ornaments, such as bracelets, bangles and beads. The source of this metal is difficult to ascertain as far as the Harappans were concerned; however small quantities of silver are frequently found in conjunction with lead at a few places in India. Lead is plentiful at Mohenjodaro (Marshall 1931: 524) and it is to be noted that traces of lead have been found in a sample of silver from the site (Marshall 1931: 524). This makes it probable that it was extracted from lead ores. Rajasthan (Rao 1973: 116), Bihar and Orissa (Marshall 1931: 675) contain several silver-bearing lead deposits; but these are small. Since Bihar and Orissa are so far from the Indus, the Ajmer and Jawar mines in Rajasthan are likely sources for these metals as far as the Harappans are concerned. But the case is not proved. Gold mines at Kolar and Anantpur also yield silver with gold, but not in quantity enough for commercial purposes.

Another silver source, possibly the most promising for Mohenjodaro and Harappa, is in Afghanistan and Iran (Marshall 1931: 675-77). Lead mines, which could have been a source for silver as well, are situated in Faranjal in the Ghorband Valley of Afghanistan and are common in southern Afghanistan, especially at Hazara Jat. Well-known silver mines are also known to have existed near the head of the Panjsher Valley in the southeastern Hindu Kush and in the vicinity of Herat.

The Persian sources are located in the southeast at Khu-i Nugre and between Fasa and Zahedan. Armenia also had silver mines at Gumush Khaneh. These were exceptionally rich and known in ancient times. Indus-Caucasus interaction, however, has still not been proved. The finds of silver in appreciable quantities at Mohenjodaro and Harappa coupled with the fact that there is little at either Lothal or Kalibangan indicates that the source was probably on the western borderlands. Afghanistan is the most likely source area at this time.

The source of lead may also be investigated. As noted above, lead ores were mined during the Harappan period. This metal was added to copper to increase the feasibility of molding and has been extensively reported in Harappan artifacts (Agrawal 1971: 156). It was rarely used for making utensils and ornaments. Large finds of lead at Harappa (Vats 1940: 58) and Mohenjodaro include only a lead vase and a lead dish (Mackay 1938: 450). Besides the dish, Mohenjodaro has produced the following lead objects: a small lead ornament with faience disc, a hook (Mackay 1938: 472) a round lead ball with a copper or bronze staple attached to it (Mackay 1938: 476) and a lump which may be the net sinker (Marshall 1931: 30). Balakot had produced a flat, semicircular piece of native lead (Dales 1979a).

Lead might have been used mainly as a smelting flux. This is evident because of the discovery of copper ore together with a small piece of lead in a bricklined pit in a house at Mohenjodaro (Mackay 1938: 41). That lead was available in India has been noted above. Afghanistani and Irani sources were, however, also quite important for the Indus, as has also been mentioned. Along the road, between the mines at Nakhlak and Bayazeh one can see numerous heaps of lead slag (Wertime 1968: 930-31). The mines of Nakhlak represent the easternmost extension of the Anarak Zone of ores. Kazakhstan is also very rich in lead, especially the western part of the Altai mountains and the Karatau range (Kalesnik and Pavlenko 1976: 199). The best mines, however, occur around Ispahan, Kirman and in the Elburz mountains. Conclusively, it seems very likely that the Harappans obtained their lead from the same place they procured their silver—Afghanistan.

Copper

Copper is not too useful for the study of trade as it is widely distributed in both Iran and India. It was very popular with the Harappans and they used it for many purposes. In fact, there is not a single site which has not yielded copper objects. This indicates that it was readily available and abundant, and, therefore, was not a precious or rare item.

The wide distribution of copper ores in India, Baluchistan, Afghanistan, Central Asia, Iran and Oman poses a serious archaeological problem: which area(s) were actually used by the Harappans? It is obvious that the whole Harappan area is not likely to have obtained copper from a single source, and the pattern of impurities in copper attests this. For example, the copper at Mohenjodaro and Harappa contained nickel and arsenic (Agrawal 1971) while Lothal copper is arsenic free (Rao 1973: 80). Several copper sources are known in India: Rajasthan, Bihar, Andhra and Kumaon. The Rajasthan mines are at Khetri, Singhana, Kho-Dariba (Alwar), Delwara Kirovli (Udaipur) and Debari (Udaipur) (Seth 1956). Of these, Khetri is the most important for two reasons. First, a close comparison of the impurity patterns derived from the spectroscopic analysis of the Harappan artifacts and various ores shows that there is a close correspondence with the Khetri mines (Agrawal 1971: 175). Second, there are copper celts, Indus arrowheads and pottery of the third millennium B.C. (Agrawala 1978, 1979) from Ganeshwar (Sikar District). This suggests that Khetri-Ganeshwar copper mines were exploited as the source for this metal since Khetri is only 60 kilometers from Ganeshwar. The copper at Mohenjodaro and Harappa may also have come from the Khetri area (or from Afghanistan as discussed later) while Lothal copper probably came from another source, possibly Oman in Saudi Arabia (Rao 1973: 80).

It is almost impossible to believe that the Khetri mines were supplying copper to all Harappan sites. Alternate sources, probably exploited by the Harappans, are on the western frontiers in Baluchistan, Afghanistan and Iran. There are copper deposits in Zhob District (Mughal 1970: 194), Robat (Hunting Survey Corporation 1961) and Shah Bellaul (Forbes 1972) area of Baluchistan. This metal has also been located between Ziarat (Quetta District) and Sohan (Sarawan Subdistrict) but it is not known that they were mined during Harappan times (Mughal 1970: 194). Huan Tsang mentions copper mines in Afghanistan and ancient workings have been located near the Safed-Kuh between Kabul and Kurram (Forbes 1972: 13). Shah Maqsud also contains rich veins of copper ore and it is said that Nadir Shah exploited them (Forbes 1972: 13). Rich ores are also said to occur at Nesh, 100 kilometers from Kandahar. Other localities are Tezin, east of Kabul, Musai in the Shadkani Pass and the Silwatu Pass (Forbes 1972: 13).

Iran is rich in copper, and metallurgy has a long tradition there going back to the fifth millennium B.C. at Tal-i Iblis in Kirman (Caldwell 1967). The best mines are in Kirman as well as Kal-seb Zarre, Sabzwar and Cahr Daud near Meshad, Kaleh near Astrabad and in the Elburz mountain districts of Kashan Kohund and Isfahan and Anarak (Wertime 1968).

There are also rich deposits with signs of ancient working in the Altai mountains at Ridder and other places. In Kazakhstan there are rich ore deposits in Makain, Boschtschekul, Kounrad and Dscheskagan. It is only certain that these were worked in recent times. Kyzyl Kum desert has a copper industry at Temba Bulach but this is of uncertain antiquity (Kalesnik and Pavlenko 1976). The eastern Iranian border also has a long belt of copper deposits.

It is difficult to say which of these deposits were definitely exploited by the Harappans. It should not be difficult to comprehend, however, that people as adventurous as the Harappans, who crossed the seas to Mesopotamia and ventured to Soviet Central Asia for trade, could have exploited several of them, some possibly indirectly through intermediaries. In short, it can be said that both Indian sources and those on the western borderlands are most likely to have been directly exploited by the Harappans. Those in the more remote areas of Iran or Central Asia may have served as "markets" from which Harappans obtained this metal in return for finished goods or raw materials. Oman may have played an especially important role in this context; but nothing precise can be said about this at the present stage of knowledge.

Tin

Copper was in extensive use during Harappan times. But tin was also known and they used it to make tin-based bronze. Nothing definite is known about tin in the Pre-Harappan tool assemblage; however Stein's findings in Baluchistan throw some light on it (Marshall 1931: 488). He collected a few bronzes from Shahi Tump, Mehi, Siah Damb and Segak Mound, all of which have a high tin percentage. This suggests an awareness during the Pre-Harappan times regarding the hardening property of tin. During the Harappan Period tin was frequently used; but even at this time it was a precious commodity as is evident from the finding of bronze scraps, stored along with other valuables in copper vessels at both Harappa and Mohenjodaro (Vats 1940: 381). According to Agrawal (1971: 168) only 14 percent of Harappan tools were alloyed in the optimum range of 8-12 percent tin. Furthermore tin bronze is more abundant (23 percent of the tools) in the upper levels of Mohenjodaro than in the lower levels (6 percent). It shows quite clearly that the availability of good quality bronze was somewhat slow to come to this site. It is possible that the same was true of other places as well.

Since the data on bronze are very limited, few conclusions can be drawn. Still one more observation can be made. The Harappans used tin-based bronzes in preference to those of arsenic or other compounds. In this respect their preference differed from that of their successors, the Copper Hoard people. These folk used arsenic when they produced the few bronze tools known of from their sites. In fact, in Post-Harappan contexts tin is very scarce for more than a millennium.

Does the scarcity of tin-based bronze objects even in Harappan contexts indicate that it was not readily available? The tin deposits known in India are located in the Palampur region of Maharashtra, Dharwar District in Karnataka and Hazari Bagh District of Bihar (Marshall 1931: 682). Bhilwara in Rajasthan and Hosainpura in Gujarat are also known to have a limited quantity of tin (Chakrabarti 1979: 70). Outside India, on the western frontier, tin is known to occur in Kuh Banan, Karadagh and Khorasan (Marshall 1931: 483-84; Vats 1940: 378-82) between Astrabad and Shah Rud in Iran (Gowland 1912) and between Bukhara and Samarkand in Soviet Central Asia (Crawford 1974; Masson and Sarianidi 1972: 128).

Of the Indian sources, those in Rajasthan and Gujarat are the most significant, though the quantity of tin is very small in these areas. The main supply of tin, may therefore, have come from the western regions: Khorasan and the area between Bukhara and Samarkand (Chakrabarti 1979: 70) through sites like Shortugai.

Here again a passing reference to Sumerian import of tin is essential. This metal was one of the commodities which the Sumerians got from Meluhha (Leemans 1970; Muhly 1976: 306-307). The scarcity of this metal in India has led some scholars to doubt that Meluhha, if it was Indus, was exporting tin (Chakrabarti 1979: 70-71). The identification of Meluhha as the Harappan Culture area has also been doubted (Chakrabarti 1979: 70-71). However, it is possible that tin was basically a trading item which the Harappans were obtaining from Khorasan and Central Asia for export to Mesopotamia, just as they obtained lapis lazuli from Badakshan for export there.

TRADE MECHANISMS

The procurement of raw materials is the first stage in trade. This may involve long distance travel as seems to have been the case during the Harappan Period when traders used to undertake substantial journeys to obtain the raw materials as well as to carry the finished goods to local and foreign markets. However, the controlling authority of the Harappan trade is still not fully known. Whether the trade was state organized or private enterprise has yet to be ascertained. But one thing is clear: a number of groups must have been actively engaged in the business operations. This may have been a very complex affair involving not only the procurement of raw materials from distant areas but also large-scale production and distribution of manufactured goods. These are operations which must have involved a number of different commercial towns doing different things.

1) *Towns connected with production.* A few Harappan groups specialized in the procurement of raw materials while others produced various goods at specialized centers. Harappa may have specialized in making metal tools while Mohenjodaro took on other metal objects, textiles, and the like. Chanhudaro specialized in bead making and seal engraving, while Lothal was also involved in bead making (Gupta in press).

2) *Towns connected with distribution.* Ports like Sutkagendor, Sotka Koh, Balakot and Lothal came under this category. They were mainly established to send consignments in various directions, particularly to West Asia.

Raw materials would have been the main concern of production centers if trade was to be carried out only in finished items. However, this was not the case with the Harappans since they are likely to have been involved in exporting both raw materials, including timber for boat making, as well as finished goods, such as etched carnelian beads. After obtaining materials from their source areas they may have taken them directly to the port for shipment to foreign markets. For example, lapis lazuli from Badakshan may have been taken to Sutkagendor in its raw form. This appears to have been the case because on the one hand finished items of lapis are very rare at Harappan sites, and on the other, there is circumstantial evidence from the location of Shortugai sites (near Badakshan) and the absence of lapis lazuli working at Shahr-i Sokhta from about 2000 B.C.

SUMMARY AND CONCLUSIONS

The purpose of this paper is twofold: first, to attempt to locate the source areas which the Harappans are likely to have exploited, either directly or indirectly, for metals and minerals; and second, to search for a pattern in the exploitation of natural resources.

These points have been raised here because many statements made in these areas, even those by very senior authors, are often vague and very general (e.g., "the Harappans got their copper from the Khetri and Debari mines of Rajasthan" or "the Harappans got their supply of gold from the Kolar mines in Mysore" or "the Harappans got the much needed steatite from either Rajasthan or Baluchistan"). But when one uses the term "Harappans" and does not specify which Harappans, those living in the Punjab or those living in Rajasthan or those living in Gujarat, one lacks essential precision. Such general usage takes the entire Harappan area as a single unit, both culturally and commercially. That is why while authors like Marshall (1931) and Rao (1973: 115) talk in terms of the total Harappan economy as though it was based largely on western borderlands trade, scholars like Shaffer (in press) can question the credibility of this formulation. In fact Shaffer (in press) offers an alternate model in which the Indus industrial economy was based primarily on its internal resources.

I disagree with both views. A culture area of a half million square miles, covering a vast variety of environmental zones, could not develop a "unilinear" economy, save under a unified empire administered by a supreme ruler, for which there is no definite archaeological proof. On the other hand, there are reasons to believe that there was a variety of Harappan socioeconomic groups. Those living in Sind must have been significantly different from those living in the Punjab as they are even today. These differences are mainly due to environmental factors like the presence of the Arabian Sea and near-desert conditions in southeastern and southwestern Sind. These features still play a major role in the socioeconomic pattern of the people of Sind, while these factors were totally absent around Harappa and other cities of the Punjab. Similarly, those living in Gujarat and those living in Rajasthan must have had their own socioeconomic characteristics. There were also marked cultural differences. For example, Black and Red Ware, Micaceous Red Ware and stud-handled bowls characterize only the Gujarati Harappan complex, while the Baluchi painted pottery finds its way only into Sind and the Punjab. It is therefore a viable working hypothesis to suggest that each regional group exploited its own metal and mineral resources. Studies also show that the sources for the metals and minerals used by the Harappans were located not only in India (Mysore, Gujarat, Kathiawad and Rajasthan) but also in Baluchistan, Afghanistan, Iran and Soviet Central Asia.

Looking at these resource areas in terms of locational proximity to the Harappan Culture area it can be suggested that the Harappans living in Sind were exploiting sources on the southwestern frontiers (Baluchistan and southern Afghanistan). Northern Iran and Soviet Central Asia were then exploited mainly by the Harappans of the Punjab. Those in Gujarat and Saurashtra were apparently getting their raw materials from the more than adequate sources in their own area, as well as from the South, including Mysore. Northern Rajasthan and Haryana must have taken most of their raw materials from central and southern Rajasthan.

For certain materials, like lapis lazuli or turquoise, there was no other choice except to go to Afghanistan (Badakshan), Iran (Nishapur) or Soviet Central Asia (Kyzyl Kum area). These resources must have been the monopoly of a few selected groups, either privately sponsored or sponsored by the state.

Since only a few sites have yielded turquoise it appears that it was not a very popular item with the Harappans. Whatever may have been the reasons for this, one thing is certain, the Harappans did get the turquoise from their western frontier regions. They had no source of their own. The mountain territory of the inner Kyzyl Kum and the mountains of Ilak

(Karamazar) in ancient Khodjent (Leninabad), and along the upper reaches of the Syr Darya in Central Asia all had good turquoise deposits. Deposits with the evidence of early work are also located near Nishapur and between Kirman and Yazd. The Harappans may have obtained this stone from Soviet Central Asia but the Iranian sources cannot be ruled out completely. But there is another likely possibility. There are very few turquoise items in the Indus: a few beads from Mohenjodaro, Rahman Dheri and Mehrgarh. Since Mundigak and Shahr-i Sokhta had turquoise production centers, these places may have been the sources for the sites, particularly when there is definite archaeological evidence of Harappan contact, at least with Mundigak.

The sources of minerals and metals in Afghanistan, Iran and Soviet Central Asia may have been more or less monopolized by one or another of the Harappan groups: those in the West Punjab. The other groups may have been getting their items through them.

The seven Harappan settlements at Shortugai on the confluence of the Oxus and Kokcha in the Hindu Kush area is evidence which seems to indicate that the Harappans of the northern region established trading posts to monopolize trade in raw materials from northeast Iran and Soviet Central Asia. In the absence of detailed reports on the Shortugai excavation one is unsure about the raw materials traded by the people of these sites. But the location to the north of the lapis mines, and at a crucial point on the trade route connecting northern Iran and Central Asia with India, suggests that they were controlling items other than lapis. Gold and tin, which also came from Central Asia and northern Iran, may have been involved as well. If these items were not under state monopoly, the people living in Gujarat and Rajasthan must have taken their lapis lazuli from the Harappans of the Punjab and not directly from the Badakshan region. Gold and tin were also coming to the Punjab from Central Asia but Gujarat and Sind may have been getting their supply of gold from Mysore. The Mysore fields, and the possible ties between the Harappans and the Southern Neolithic, have already been discussed. Two further points need to be added. First, the gold at Neolithic sites like Piklihal, Kodekal and Maski almost has to come from the Mysore sources which were thus worked during the third millennium. Second, some gold from Mohenjodaro has silver as a trace element and this is what would be expected if Mysore was the source. This is, of course, excepting those objects which are made of electrum, an alloy of gold and silver. A valid objection to this hypothesis may lie in the absence of Harappan sites between Gujarat and the Andhra/Mysore region. By and large it is true, but the discovery at Daimabad of a terracotta seal with a Harappan sign, and a sherd with three signs, as discussed in S.A. Sali's contribution to this volume, speaks for links between the Harappan and Neolithic-Calcolithic culture zones. There is also some force to Rao's argument for Indus-Neolithic trade based on the occurrence of thin paste "Harappan" beads in the Neolithic sites. Unfortunately, silver is also present in Soviet Central Asian gold (Kalesnike and Pavlenko 1976: 202). One of the largest mother lodes of gold has been discovered in the Murunatau Mountains, in the Kyzyl Kum desert. (It may be recalled that turquoise is also found in Kyzyl Kum.) It is, therefore, quite possible that this gold came to the Indus; but there is no way of ascertaining which objects were made of the Mysore-Maski metal and which of the Kyzyl Kum.

Tin in western India is reported from Bhilwara (Rajasthan) and Hosainpura (Gujarat); however there is very little of it. The other sources for tin are Khorasan, Kara Dagh and the area between Bukhara and Samarkand. It thus appears that this scarce metal could only be obtained and used in some significant quantity when regular trade was established between the Indus and Central Asia. This is precisely why tin-based bronze objects at Mohenjodaro came in larger numbers from the upper levels (Agrawal 1969-70: 16). The tin that went from Meluhha to Mesopotamia also probably originated in Central Asia (including northern Iran and northern Afghanistan). The same may be true of silver and lead. As noted earlier, only Iran and Afghanistan could supply silver and lead to the Indus. This is also evident from the frequent use of silver at Mohenjodaro and Harappa. However, Rajasthan and Gujarat may have obtained their silver from the Ajmer and Zawar mines of Rajasthan. The quantities may have been limited as the people there used it sparingly.

Copper has a very wide distribution in India, Baluchistan, Afghanistan, Central Asia, Iran and Oman. It thus poses a serious problem to the archaeologists who want to know which areas were actually used by the Harappans.

A number of scholars, including Desch (1931), Ullah (1940: 378-79), Ray (1956) and Agrawal (1971) have tried to establish the sources of copper exploited by the Harappans. Their approach has been a comparative study of the nature of impurities present in artifacts and copper ores from different areas. On the basis of the presence of lead in the Harappan tools (Agrawal 1971: Table 13-14) Desch proposed that the Baluchi ores were exploited by the Harappans. But the Baluchistan copper ores do not show any lead.

Based on the presence of arsenic, nickel and lead in artifacts from Mohenjodaro and Harappa, Ullah (1940) determined the sources of their copper to have been Khetri, Alwar, Singhbhum and Afghanistan mines where nickel and arsenic both are supposed to be present in the copper ores. He held that the Sumerian ores could be distinguished from Indian ores since the former are virtually free from arsenic (Ullah 1940).

Agrawal (1971) has made spectrographic analyses of Harappan artifacts and of various ores. He took twenty elements into consideration and found that the metallic composition of Harappan artifacts is close to the composition of the Khetri ores. He thus holds that Khetri is the area which the Harappans of the Punjab and Sind exploited. He further observes that the Khetri sources alone could justify the Mesopotamian imports of copper from Meluhha. The discovery of several copper celts, an Indus arrowhead and the Ochre Colored Pottery of the late third millennium B.C. by R.C. Agrawala (1978) at Ganeshwar also gives weight to this theory. Khetri is only 60 kilometers from Ganeshwar.*

All these analyses show that Harappan copper objects have arsenic, nickel and lead. The Khetri belt was very well situated for the Harappans to get copper; but did it provide everything? Possibly not. As one knows, the Afghanistan sources also contain arsenic, nickel and lead and, therefore, it may be possible that these sources were used. After all Indus-Afghan contacts were regular. The Harappans of Sind and Punjab, therefore, are likely to have exploited the mines of Afghanistan in addition to the Khetri source. The Baluchistan ores—Robat and Shah Bellual—should be analyzed more carefully. But there were certainly more sources than those of the Khetri belt and Afghanistan. The Lothal and Rangpur copper tends to prove it beyond doubt, since it is arsenic free (Rao 1973). This fact points to Oman as a source since copper there is supposed to be arsenic free. Rao supports this hypothesis by further observing that Oman was apparently supplying copper to the Sumerian cities since their copper tools were also free of arsenic. But this does not appear to be the case. Agrawal's Table 11 (1971) shows that at Khafaje and Ur, 88 percent of the artifacts contain arsenic. So this difference is ruled out. One is not sure about the Oman sources and their pattern of impurities or any correspondence to the Lothal/Rangpur copper. More data are needed before one can arrive at a sound conclusion.

The frequent use of steatite for making various objects leads one to believe that there was a regular flow of this mineral to the Harappan cities. A number of steatite sources are reported in North Gujarat (Devni Mori, Kundol, Lokha and Mora) and in Rajasthan (at Dogetha, Gisgarh and Morra). Marshall thought that Rajasthan was giving steatite to the Harappans while Rao suggests that Mysore might have supplied this material to the Indus people through the contemporary Neolithic folk of the Deccan. But with steatite locally available in Gujarat and Rajasthan why would the Harappans have gone all the way to Mysore?

The most promising source for steatite is northern Baluchistan and the area around Fort Sandeman. This zone might have supplied steatite to the Sind-Punjab area. Another piece of evidence which adds to the credibility of the Baluchi sources is the scientific analysis of the stone vases from sites in Syria, Mesopotamia, Iran and the Indus (Kohl 1975, 1976). It shows that the stone for these objects came from several different sources. It has also been proved beyond doubt that the Sumerian chlorite is different from the Yahya chlorite and that the former is much more like that coming from the east of Yahya. Baluchi sources might thus have been exploited by the traders to fulfill Mesopotamian demand.

The sources for chlorite in Kirman, were also known to the Sind Harappans. They exploited these for raw material and/or finished steatite vases.

As far as carnelian is concerned, its use was fairly common amongst the Harappans. Etched carnelian beads are important because they crossed the Indus borders to reach Iran and Mesopotamia. This stone was readily available over a vast area of India. A number of sources are located in Madhya Pradesh, Rajasthan and Gujarat. It was probably supplied to the Harappans of Kathiawad, Kutch and other southern areas from the Rajpipla mines of Ratanpur. The Harappans, themselves, then traded this stone to other parts of the civilization.

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*Editor's note: See R.C. Agrawala's paper in this volume for a discussion of recent copper finds in Rajasthan.

The Iranian source for carnelian lies in the dried up branches of the river Helmand in Seistan near Shahr-i Sokhta. But in the absence of archaeological remains one cannot be sure that the Harappans knew of this source. Carnelian is also on the list of Mesopotamian imports from Meluhha. If Meluhha can be equated with the area of Harappan Culture it was then exporting carnelian, probably from Indian sources.

If the above analysis is correct, even approximately, one then has every reason to believe that the exploitation of different metal and mineral sources was more a matter of regional organization than a business of centralized agencies like the state. This observation is applicable even to those items (e.g., lapis lazuli) which may have been the monopoly of one regional group or the other. The Indus area covers too much territory and could not be traversed without a large network of well-maintained roads and fast-moving vehicles, for which, so far, there is no definitive proof.

If the pattern of exploitation of natural resources was regional, and not centralized, can this be seen in the archaeological records? I have already mentioned the evidence of copper-bronze tools (in Gujarat sites the copper is arsenic free while in the Punjab and Rajasthan it has arsenic). Obviously, two different copper sources were exploited by two different groups of people. There is also the evidence of steatite and chlorite which shows that while Baluchi sources were exploited by those in the Punjab and Sind, the Rajasthan and Gujarati sources were exploited by the Rajasthani and Gujarati Harappans. There is also similar evidence for tin, silver and lead. The case for gold is not as clear since gold from both Mysore and Central Asia contains a small percentage of silver. On grounds of geographical proximity and the location of Shortugai it is suggested that while Gujarat may have taken this precious metal from South India, the Punjab sites may have obtained it from Soviet Central Asia. Lapis was certainly a monopoly item with one of the North Harappan groups. The Gujarati Harappans monopolized trade in etched carnelian beads. Turquoise at Indus sites is extremely limited, (only to a few beads at Mohenjo-daro, Rahman Dheri and Mehrgarh), therefore, it may have come to the Indus in its finished form from sites like Mundigak.

The situation can be summed up by reiterating the basic stand: the natural resources used by the Harappans were widespread, with enormous choice in source areas. These facts determined the exploitation pattern which was, by and large, regional.

NOTE

[1] These two major units were further subdivided into smaller organizations as well. For the moment I will only focus on the production and distribution units.

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STEVEN A. WEBER

26. Changes in Plant Use at Rojdi: Implications for Early South Asian Subsistence Systems

INTRODUCTION

A growing tendency in South Asian Archaeology is to associate changes in agricultural practices and plant-use strategies with the "deurbanization" of the Indus Valley and more local styles of material culture (Meadow 1989:1). It has been suggested that these subsistence changes occurred at the beginning of the second millennium B.C., and are thought to have involved crops and animals not previously used in the region (Meadow 1989; Possehl 1986; Jarrige 1985; Shaffer 1986). The purpose of this paper is to examine this proposition in the light of data from the site of Rojdi. The archaeobotanical data base used to construct theories of South Asian subsistence, and specifically plant use, has in general been limited to noting the presence of a plant at particular time periods. Of the 80 or so sites from South Asia dating to earlier than 1000 B.C. that have yielded plant remains of some form, few contain more than a single taxon and most contain only accidental finds (Weber 1989b). This data base not only represents a vast geographical region characterized by a variety of climates, soils and moisture patterns, but also a temporal range of nearly six thousand years and is based on a variety of sites showing different levels of complexity. However, while the limitations of this data base may be skewing some of our interpretations regarding plant-use patterns. The identification of major changes in subsistence strategies during the third millennium B.C. does seem to be accurate. The results of the Rojdi palaeoethnobotanical investigation, in particular, bear out the perception that changes in plant use were occurring during the third millennium B.C. The results also reveal both significant shifts in the plants used, and their distributions, as well as the introduction of new taxa. Findings at Rojdi further demonstrate how many aspects of plant use remained unchanged, how dietary practices may have been unstable, and how common elements of Harappan subsistence, namely the early establishment of a sophisticated cultivation strategy and diversification and intensification of subsistence strategies over time, existed alongside distinctive regional variation both in the types of plants used and in the particular expression of these trends.

This is a brief account of the botanical findings at Rojdi, demonstrating how subsistence appears to be changing, and how this information tends to support some hypotheses concerning Harappan subsistence as a whole, while challenging others. After a short description of the site, two sections on the shared and the differing elements of Rojdi subsistence over time will be presented.

ROJDI

Rojdi is a Harappan, or Sorath-Harappan site (Possehl and Herman 1989), in central Saurashtra, with three consecutive occupations dating from the middle of the third millennium B.C. to the beginning of the second millennium B.C. (described as

Phases A: 2500–2300 B.C.; B: 2300–2000 B.C. and C: 2000–1800 B.C.). Artifactual material recovered at the site includes both characteristic Harappan and regional variants (Possehl and Raval 1989). Analysis of findings from excavation, collection and identification of plant remains, and the study of the distribution of these remains throughout the site and in association with other archaeological features, has led to the reconstruction of Rojdi subsistence for all phases of occupation.

Three quantitative methods were used in the analysis (namely, ubiquity, density and percentage[1]) to ameliorate the biases in the data caused by differential methods of deposition and preservation. Although over 80 taxa were found at the site, only those species thought to be crucial to subsistence will be discussed here. For a more complete review of the palaeoethnobotanical study performed at Rojdi, see Weber 1989a.

ROJDI PLANT-USE: THE COMMON ELEMENTS

A general subsistence pattern appears at Rojdi throughout all phases of occupation. Although proportions and numbers of the faunal remains at the site are lacking, the animal portion of the subsistence presently suggests that this was a site where animal husbandry and hunting were going on, and where cattle and some sheep and goats were being raised. Meanwhile, in the plant portion of the subsistence system, a single group of recurring taxa make up the bulk of the archaeobotanical record in all phases of occupation.

Thirteen plant taxa, or plant categories (*Chenopodium album*, *Dactyloctenium aegyptium*, *Digera muricata*, *Eleusine coracana*, *Euphorbia* sp., *Ficus* sp., *Indigofera* sp., *Melilotus* sp., *Panicum miliare*, *Panicum* sp., *Setaria* sp., *Trianthema* sp.), were observed in all periods of Rojdi occupation. Carbonized remains of these plants from secure proveniences account for over 70 percent of the archaeobotanical material from Rojdi A, B and C. Moreover, at least one of these 13 taxa are represented in nearly every sample from the site, and they add up to an average density of greater than 19 seeds per 10 liters of soil (Table 26.1 and Fig. 26.1)

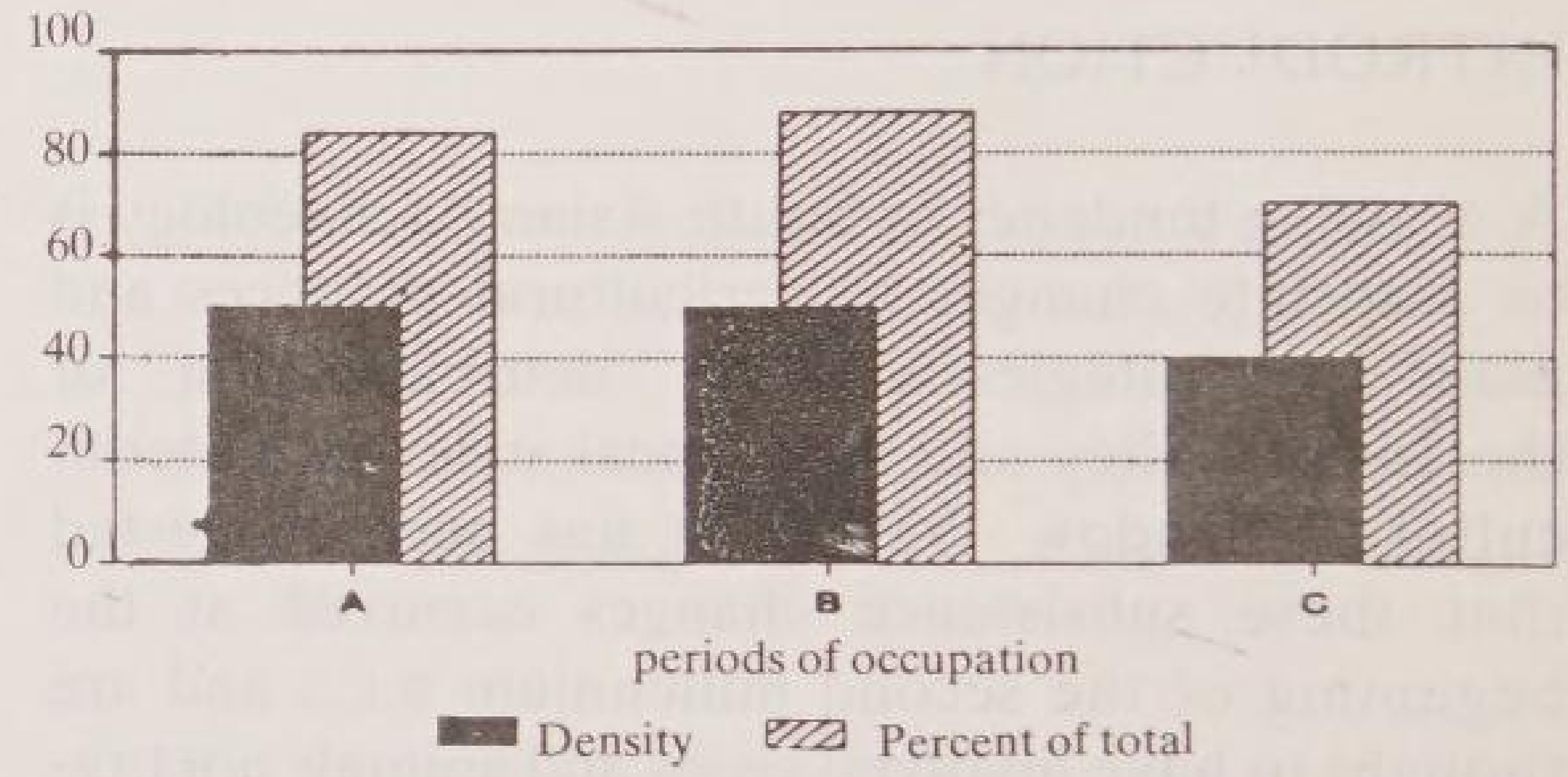

Fig. 26.1. The common plant-based subsistence at Rojdi, comprising 13 recurring taxa.

Table 26.1. Comparisons of percentage (P), ubiquity (U) and density (D) of archaeobotanical material only found in Rojdi A, B C.

	ROJDI A			*ROJDI* B			*ROJDI* C		
TAXA	P	U	D	P	U	D	P	U	D
Cheno-Ango	0.3	4	0.01	0.1	3	0.005	0.3	3	0.01
Chenonodium allum	3.4	17	0.21	57.0	32	2.8	3.0	8	0.06
Datylogtantium asgyetium	0.4	7	0.03	0.3	6	0.01	1.0	6	0.03
Digera	0.2	1	0.01	0.1	3	0.005	3.0	11	0.07
Eleusine	62.0	31	3.86	5.0	58	0.29	3.0	10	0.09
Euphorbia	0.4	5	0.02	0.1	3	0.005	1.0	5	0.03
Firus	0.6	5	0.03	0.3	6	0.01	0.5	1	0.02
Indigofers	0.4	5	0.02	0.3	6	0.01	0.6	3	0.02
Melilotus	0.2	3	0.01	0.2	3	0.01	0.5	1	0.02
Panitum	0.08	7	0.05	1.0	9	0.06	3.0	19	0.03
P. Miliare	12.0	32	0.77	21.0	57	1.02	3.0	11	0.07
Setaria	1.6	18	0.09	1.0	25	0.06	33.0	56	1.00
Trienthenia	1.2	18	0.08	2.0	23	0.09	18.0	28	0.50
Total/avg.	83.4	—	5.16	88.4	—	4.33	70	—	1.96

At a finer level of analysis, four common food plant taxa (*Eleusine coracana, Panicum miliare, Setaria* sp., and *Chenopodium album*) emerge from this list of 13 and account for a significant portion of the archaeobotanical material from each occupation. Not only are these four taxa represented in high percentages, densities and ubiquities (Fig. 26.2) in Rojdi A, B and C, but as a group of food plants they probably represent the core of the plant portion of the subsistence system at Rojdi.

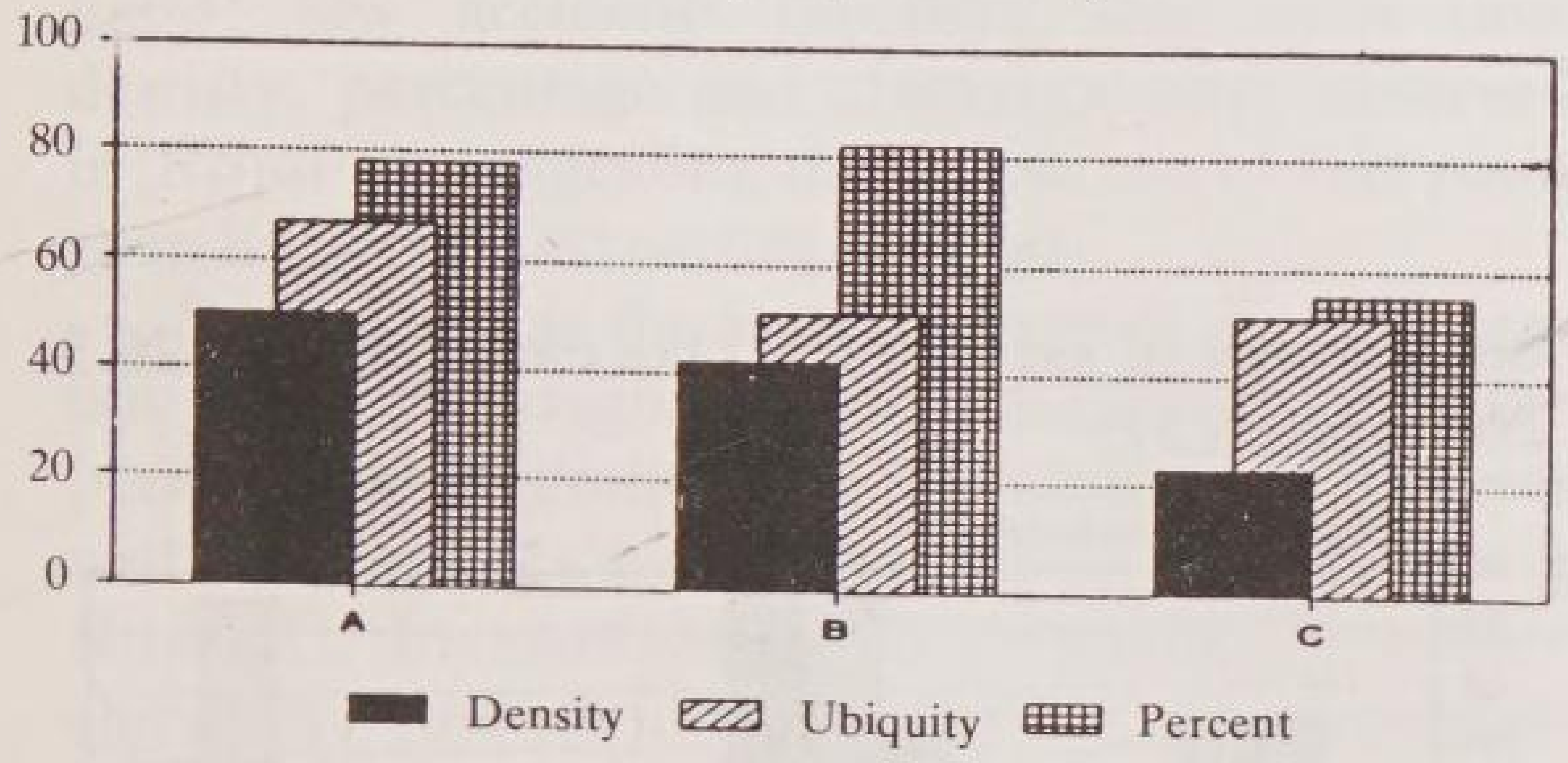

Fig. 26.2. Density, ubiquity and percent of four main recurring taxa (*C. album, E. coracana, Setaria* and *P. miliare*) probably used for food in Rojdi A, B and C.

Three of these four most commonly recurring taxa can also be classified as millets (*E. coracana* or finger millet, *P. miliare* or little millet, and *Setaria italica* or Italian millet). These three species are well suited to a variety of soils and to hot, dry conditions. They are all considered drought resistant, needing an annual rainfall of between 30 and 70 cm. They need little water to grow, and can produce some seeds in years of minimal rainfall. Their growing season is associated with the summer monsoon. Once planted, they take between two and four months to mature and provide nutritional seeds and fodder. Cultivated *C. album* also fits most of these criteria, with the exception of cropping season, since it is generally found growing in the spring time.

Cultivation seems to have been important at every phase of occupation at Rojdi. If the number of seeds representing species which were probably being cultivated are added together for each period of occupation, nearly 80 percent of archaeologically deposited seeds represent cultivated plants. Not only is there little change in this percentage from one occupation to another, but it suggests a relatively high dependence on cultivated plants or species which were intensively managed. This high percentage is corroborated by the calculations for density and ubiquity.

In summary, Rojdi is best viewed as a food-producing settlement occupied throughout the year, where cultivation and various pastoral activities were being performed locally and were supplemented by plant gathering and hunting. The bulk of cultivation centered on plants producing small seeds from compacted heads and a summer monsoon-based weather system, although plants that flourish in other seasons were also used. Finally, the plants being exploited did not need intensive human involvement and were all hardy, drought-resistant species, implying a climate and habitat not that different from what is found in the region around Rojdi today.

Rojdi Plant-use: The Differing Elements

While certain plant and animal species are common throughout all phases of Rojdi, the subsistence system is not without variation and change. Although little faunal data are presently available for the elicitation of patterns over time, plant use seems to have undergone significant change during the multi-phase occupation. This change is less a shift to new species than to altered dependence on existing ones. While the number of species being exploited does increase, the majority of remains from each occupation period are the same, recurring species.

In an effort to compare Rojdi A, B and C plant remains to show above-average occurrence of any given species, a method was devised which would incorporate all three quantitative methods of analysis (percentage or proportion, density, and ubiquity). Cut-off points were calculated for each of these quantitative methods, above which only the above-average plant occurrences would register. For percentage, this would mean that a plant species would have to account for above four percent of the recovered material deposited during a given occupation in order to register. For density, all species which had an average rate of one seed per three liters of soil from a given occupation would register. And finally, an ubiquity rate of greater than 18 percent of the samples from a given occupation at Rojdi would also register. Based on these criteria, six taxa registered above average in at least one category during either Rojdi A, B, or C

Table 26.2. Rojdi archaeobotanical remains with above average occurrence.

TAXA	A	B	C
Chenopodium	2,3	1,2,3	0
Eleusene	1,2,3	1,3	0
Panicum	1,2,3	1,2,3	0
Setaria	0	3	1,2,3
Trianthema	0	3	1,2,3
Zizyphus	1	0	0

1—Greater than 4 percent of material from occupation.
2—Greater than 1 seed per 3 liters of soil.
3—Recovered in more than 20 percent of the samples from an occupation.

(Table 26.2). Four of these taxa (*C. album, E. coracana, P. miliare* and *Setaria*) are the same recurring food plants found throughout Rojdi, one is a common weed (*Trianthema* sp.), and the final taxon represents a probable food plant (*Zizyphus* sp.) that registered in only one category (percentage) and in only one occupation (Rojdi A).

These six taxa account for more than 60 percent of the identifiable, carbonized material from secure proveniences, and their incidence suggests a certain amount of homogeneity in the Rojdi plant record. However, further examination does show variation in their distribution and quantities throughout the occupation of the site. What first becomes apparent is that Rojdi A and B have more in common with each other than either has with Rojdi C. *Chenopodium album, E. coracana* and *P. miliare* register above average in at least two of the three quantitive categories during occupation A and B, and fail to register at all in Rojdi C. In contrast, *Setaria* sp. and *Trianthema* sp. fail to register at all in Rojdi A, only register in the ubiquity category in B, yet are above average in all categories in Rojdi C. Therefore, based on the plant record alone, Rojdi A and B should be regarded as subphases of one occupation phase, and Rojdi C is a different occupation phase altogether. It is interesting to note that this conclusion is in broad agreement with the ceramic evidence. Rojdi A and B are considered to be a part of the Urban, Mature Phase of the Indus Civilization, and Rojdi C is thought to be a part of the Post-urban Phase. By focusing on five of the recurring and prominent plant taxa (excluding *Zizyphus* sp.), and by charting the occurrence of each species separately throughout the occupation of the site, a changing strategy of use of these taxa emerges (Fig. 26.3, 26.4 and 26.5).

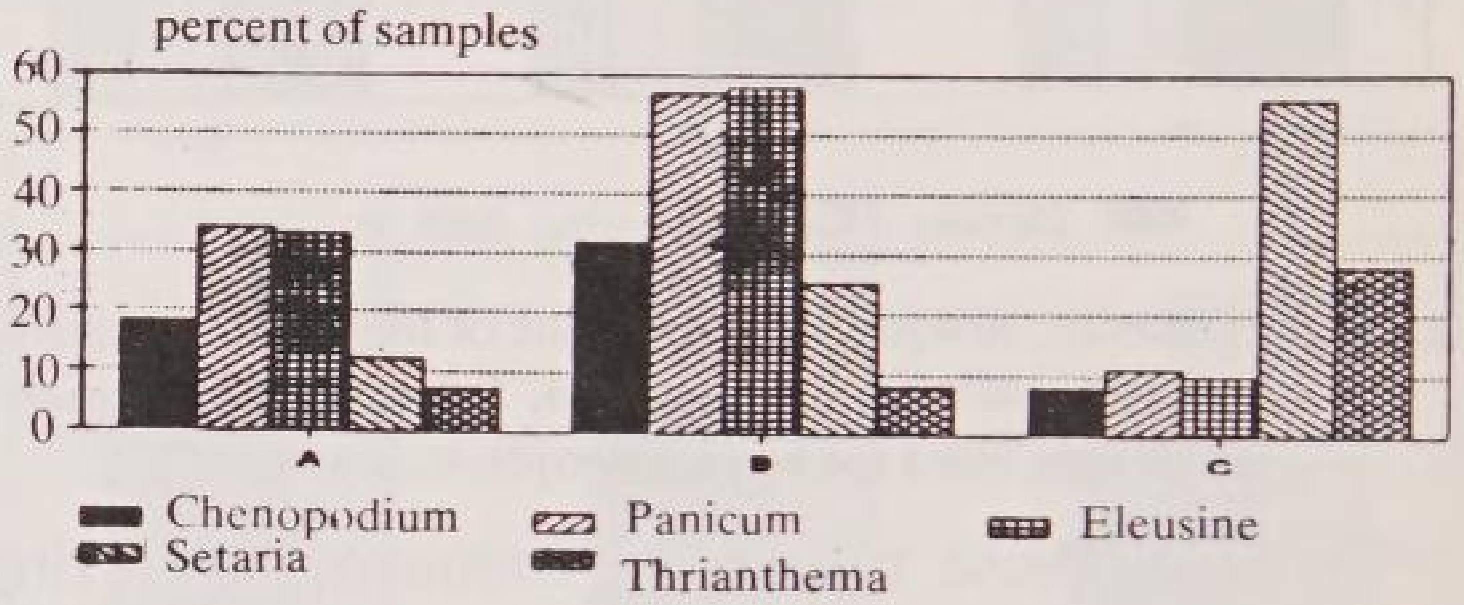

Fig. 26.3. Based on ubiquity, the distribution by occupation of the five most common Rojdi taxa.

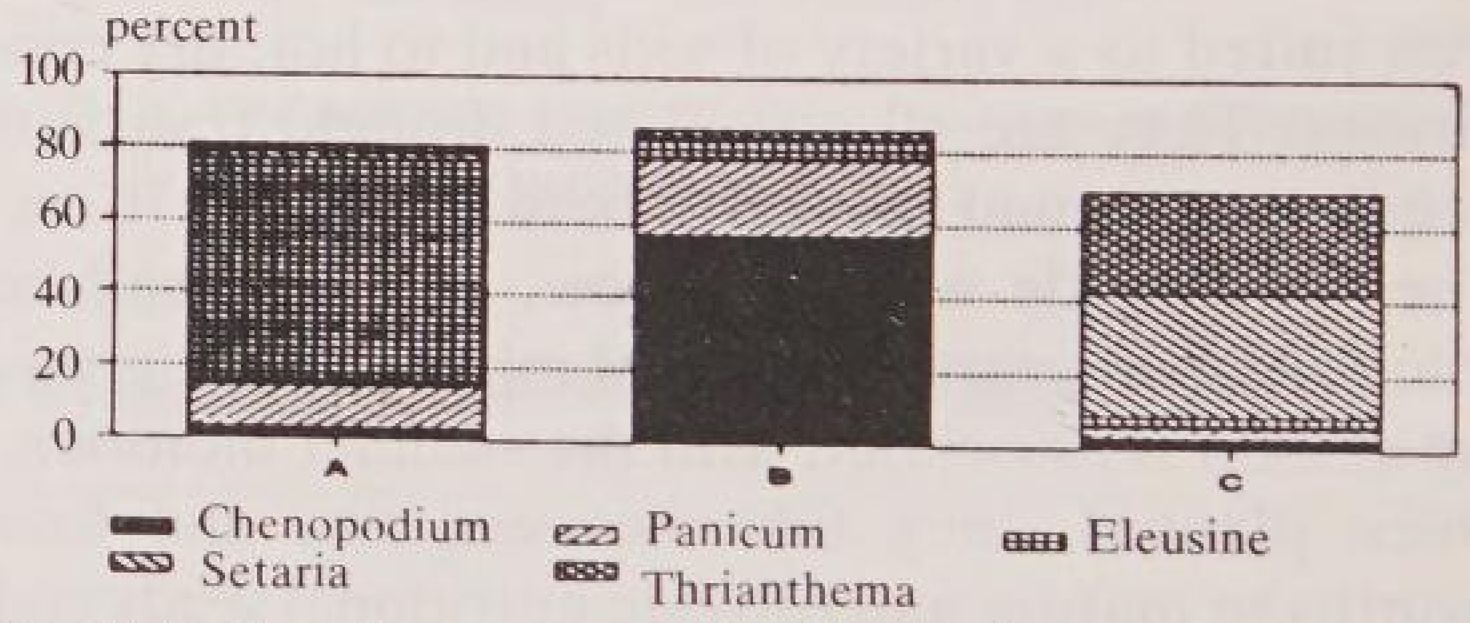

Fig. 26.4. Based on percent, the distribution by occupation of the five most common Rojdi taxa.

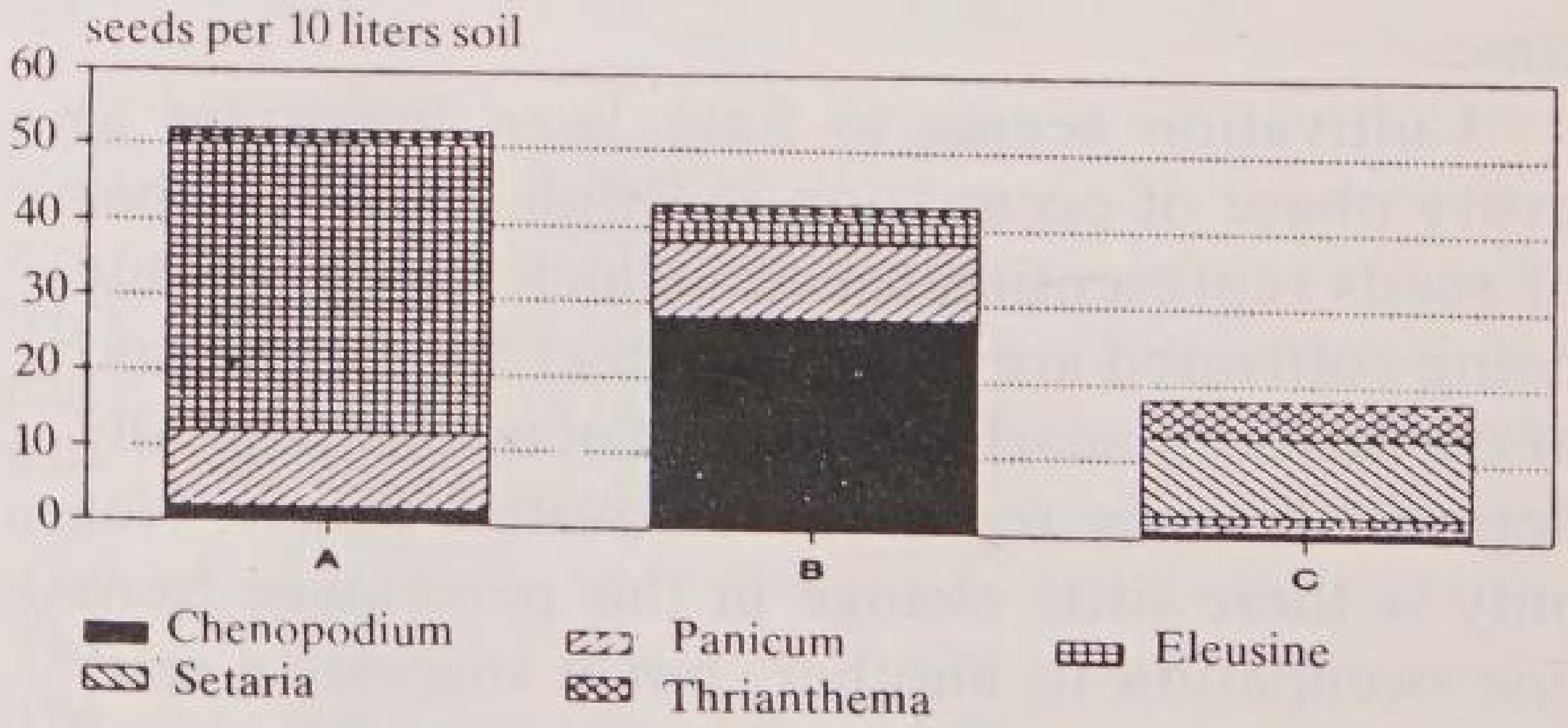

Fig. 26.5. Based on density, (seeds per 10 liters soil). The distribution by occupation of the five most common Rojdi taxa.

E. coracana shows a significant drop in percentage, ubiquity and density from Rojdi A to C. During Rojdi B, *E. coracana* drops in percentage and density, though not to the levels found in Rojdi C, while the ubiquity actually goes up to a level approaching 60 percent. This pattern implies that while the overall trend is for lessened use of *E. coracana* during Rojdi B, more accidents, (causes of preservation involving accidental carbonization), involving fewer grains occurred. On the other hand, few accidents involving few seeds (low density, percentage and ubiquity), were observed in Rojdi C, suggesting much less use of this plant than had occurred earlier at Rojdi.

P. miliare has the same pattern as *E. coracana*, but to a lesser degree, In both Rojdi A and B, the percentage of grains and the number of samples with this species were significantly higher than in Rojdi C. In contrast to *E. coracana, P. miliare* shows increases in ubiquity, density and percentage in Rojdi B over A. In Rojdi C, there is a decrease in *P. miliare* according to all methods of computation compared to B. By Rojdi C, *P. miliare* is occurring at a rate comparable to *E. coracana*.

The pattern for *C. album* is more like *P. miliare* than any other food plant, in that it occurs most frequently in Rojdi B. But like both *P. miliare* and *E. coracana*, it occurs at the same low density, ubiquity and percentage in Rojdi C. Interestingly, the numbers for all three species are nearly identical in Rojdi C—three percent of the total, less than one seed per liter soil and a ubiquity rate of nearly 10 percent.

In contrast to the above four species, the pattern of *Setaria* use at Rojdi is the simplest to follow. In Rojdi A and B the occurrence of *Setaria* is nearly the same, at a very low density, percentage and ubiquity. In Rojdi C, *Setaria* sp. increases according to all three methods of calculation to over three times the levels seen in A or B. While *Setaria* sp. is referred to here as a single category, in reality three independent species have been tentatively identified, the most prominent among them being *S. italica*. All three *Setaria* species show the same pattern that is presented here for *Setaria* sp. as a group. By the Rojdi C occupation, *Setaria* sp. becomes the most commonly recovered food plant, occurring at over 10 times the rate observed for *E. coracana, P. miliare,* or *C. album*. There is no doubt that not only has *Setaria* sp. increased in occurrence, but this increase is at the expense of the food plants which previously were most common.

The inclusion of other, less common millets from the Rojdi occupation (e.g. sawa millet or *Enchinochloa colonum*, and kodo millet or *Paspalum scrobiculatum*) does not controvert the general picture that has been sketched (Fig. 26.6). Once again, the plasticity of these species with regard to environment and weather conditions within a certain range, implies that while climatic fluctuation may have been a problem for the Rojdi inhabitants, a change in the proportions of millet crops may have been more the result of culturally-based decisions than of lasting, dramatic environmental change.

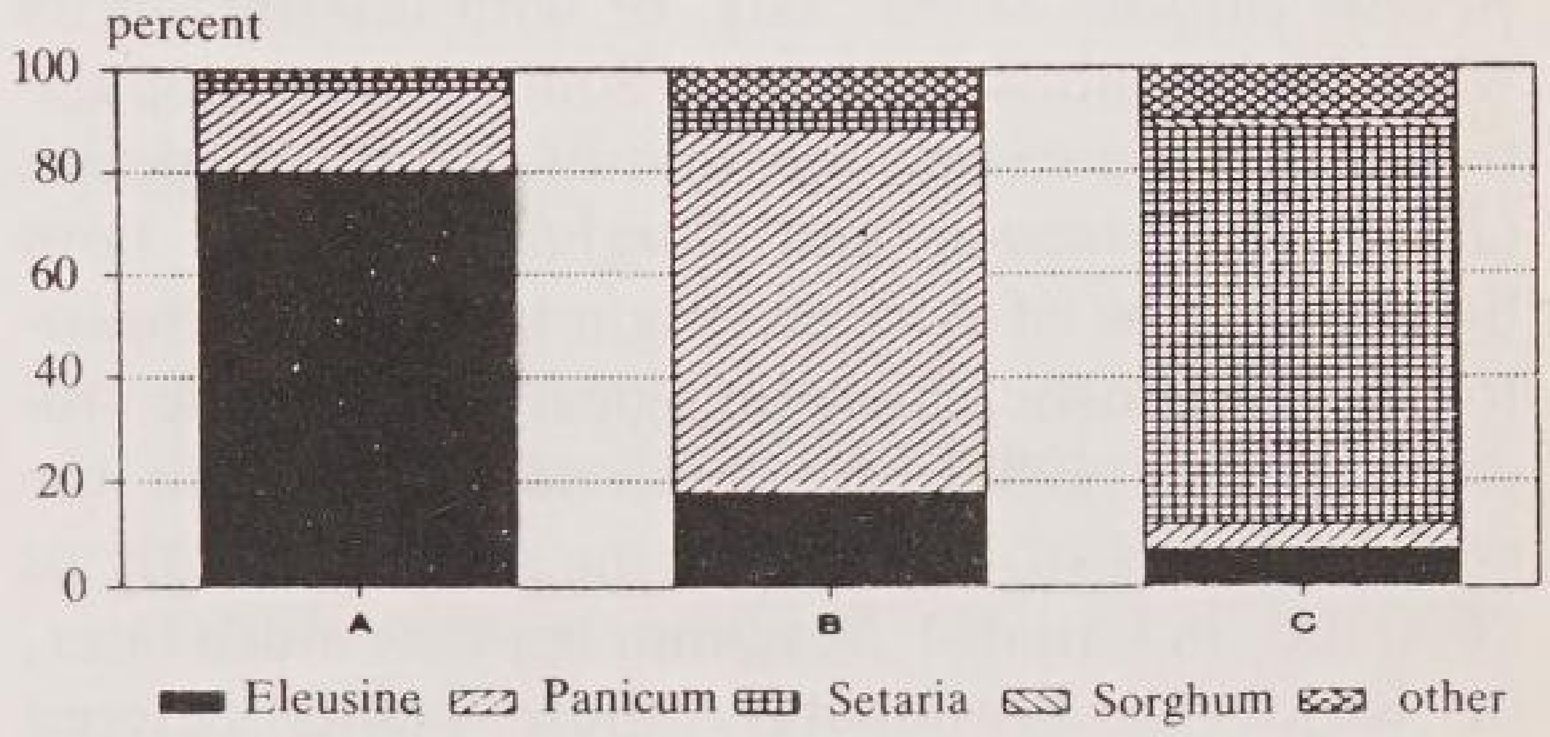

Fig. 26.6. Millet percentages for Rojdi A, B and C.

One recurring taxa, which also registered as one of the above average occurring taxa, is *Trianthema*, a common weed. Increased occurrence in successive levels of *Trianthema* is mirrored by other weed species, so that by Rojdi C they represent nearly 30 percent of recovered carbonized remains. The taxa in this category include Cheno-Ams, *Trianthema, Euphorbia*, as well as many of the common weed grasses. While the ubiquity and percentage of weed seeds steadily increase in successive levels, the density of weed seeds remains much the same, with only a very slight increase over the occupation of the site.

While each occupation phase contains taxa unique to that phase, the largest number of new species occurs in Rojdi C, new species that are, moreover, mostly food plants. Of the 29 taxa observed only in Rojdi C, more than half were carbonized and deposited during this occupation. Though the numbers (density, percent and ubiquity) imply that they were not used much, their appearance alone is significant. The most interesting of these new taxa are jowar, sawa millet, grass pea, linseed, and green gram. What makes these species interesting is either their origin or probable season of cultivation.

The addition of new species to the Rojdi record which were not indigenous to South Asia suggests continued or periodic, direct interaction with people outside South Asia, or with intermediaries who had contact with non-South Asian populations. A good example is that of two plant species (*Eleusine coracana* and *Sorghum bicolor*) both believed to be of African origin based on archaeological, linguistic, morphological and genetic studies (Weber 1988). *E. coracana* is found in the earliest levels of Rojdi implying its use as early as 2600 B.C. in Gujarat. Sorghum appears much later, in Rojdi C. Presumably, these plants entered Gujarat at different times, supporting the argument of either continuous or multiple periods of interaction with people in Africa, or with people who had contact with African populations. Outside influence may have increased over time, judging from the heightened incidence of non-indigenous plant species throughout the occupation. Many of these new taxa in Rojdi C are considered winter crops. Though small in number, the presence of linseed, grass pea and other pulses implies an increasing focus on winter cultivation. Winter cultivation, if it was carried out as it is today around Rojdi, would have involved the diversion of low river water to shallow irrigation ditches in the dry portion of the river bottom. This tendency toward non-summer cultivation seems to be borne out by smaller percentages among the taxa solely suited to summer cultivation. However, while winter cultivation probably occurred and increased in importance during the Rojdi C occupation, summer cultivation was still the primary focus of subsistence activity, with wild plant collecting as a supplementary practice.

CONCLUSION

A general plant-based subsistence system can be identified at Rojdi, which is maintained throughout the Harappan portion of the occupation. In this system, Rojdi was a food-producing settlement occupied throughout the year where cultivation, the use of domesticates, and various pastoral activities were being performed locally, and where, to a lesser extent, plant gathering and hunting were also being practiced. This bulk of cultivation was centered on the summer monsoon and involved millets, although winter cultivation increased in importance during the occupation. In addition, the plants being exploited never needed intensive human involvement and were all hardy, drought-resistant species.

However, while the basic elements of the general subsistence system remained unchanged, some significant shifts in the plants and their distributions, expressed chiefly in the form of altered dependence on existing species, can be observed through the occupation. These shifts resulted in a broadening and an intensification of plant-use strategies.

Many plants being used at Rojdi came from outside South Asia, although some indigenous species, including cultigens, do show up. The introduction of non-indigenous species into Rojdi indicate periodic or continuous interaction with people outside, or with intermediaries who had contact with non-South Asian populations.

While realizing that Rojdi is a single site and that the results of the palaeoethnobotanical analysis may be unique to Rojdi, it nonetheless suggests that changes in subsistence systems do not have to be related to the introduction of new species, and that plant usage strategies were changing earlier than previously believed. The significance of the Rojdi analysis is even more significant when the limited nature of the South Asian archaeobotanical record is taken into consideration.

Finally, it should be realized that the purpose of this paper is simply to identify the types of changes which were taking place in subsistence from the middle of the third millennium to the beginning of the second millennium B.C., and that attempts to explain what caused them, or what their impact may have been, await further exposition.

NOTES

[1] "Density" is the number of seeds per liter soil, and is thought to reflect the intensity of accidents, and hence activities. "Percentage" is the relative abundance of a specific taxon in a given assemblage and is used to gauge floral importance. "Ubiquity" is the percentage of samples from which a specific taxon was recovered and is thought to measure the overall number of accidents that occurred, and therefore the degree of use. For further discussion of these measurements, see Weber 1989b.

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27. Animal Domestication in the Middle East: A Revised View from the Eastern Margin

"In fact, there were neolithic farmers in Baluchistan before unambiguous influence from the west is archaeologically detectable."
V. Gordon Childe 1952 (1964): 197.

THE eastern margin of the Middle East, encompassing what are today Afghanistan, eastern Iran, and Pakistan west of the Indus, has long been considered a region which was on the receiving end of cultural influences from "more advanced" areas to the west. This view has been particularly strongly held for the development of field crop agriculture and stock breeding, both of which are generally thought to have originated in the area of the Fertile Crescent and to have spread, more or less gradually, west through Europe and east into South and East Asia. Unlike most of Europe, however, the eastern part of the Middle East lies within the natural ranges of the wild relatives of most members of the agricultural complex which came to dominate the prehistoric subsistence economies of the region. Thus, wild barley, sheep, and goats are still found in the highlands today, and the area is included, within what is thought to have been the natural range of wild cattle (e.g., Harlan and Zohary 1966, Zohary and Hopf 1989, Zohary 1989, Herre and Röhrs 1977, Uerpamann 1987, Meadow 1990). Only wheat (*Triticum* sp.) has no known wild relatives with the AA or AABB genomic constitution east of the Zagros (Zohary and Hopf 1988), while rice, sorghum, millets, horse, camel, and pig became economically important only during the 2nd millennium B.C. (Costantini 1981, Meadow 1989), In addition, special forms came to characterize the region, notable examples including round-grained wheat and barley (*Triticum aestivum* subsp. *sphaerococcum* and *Hordeum vulgare* subsp. *sphaerococcum*: see Costantini 1984) and zebu cattle (*Bos indicus*). Indeed, a South Asian origin for humped cattle has long been postulated by naturalists. zoologists, and even prehistorians (e.g., Darwin 1859: 18, 254; Rütimeyer 1867; Childe 1952 (1964): 197). Until recently, however, there was no evidence for agricultural villages dating prior to c. 4500 B.C.[2] on the eastern margin of the Middle East or in South Asia (e.g., Fairservis 1975). Excavations at the site of Mehrgarh in Pakistani Baluchistan, however, have altered the picture markedly, pushing back the development of field crop agriculture and animal husbandry in the region to at least the 7th millennium B.C. (Jarrige and Meadow 1980, Jarrige and Lechevallier 1980, Lechevallier and Quivron 1981, Costantini 1984, Jarrige 1987).

In the following pages, I discuss the implications of the Mehrgarh faunal evidence for our understanding of animal domestication in the Middle East. As background, I briefly define "domestication" and discuss the kinds of evidence which have been used to identify the presence of that process from osteological remains. Next, I summarize the faunal data so far available from Mehrgarh and place it in archaeological, geographical, and temporal context. Finally, I speculate on the reasons for the adoption of animal husbandry on the eastern margin and on the implications of the

Baluchistan evidence for other parts of the Middle East.

ANIMAL DOMESTICATION

Animal domestication, in the case of food species, can be defined as being a selective, diachronic process of change in human-animal relationships involving, at the very least, a shift of focus from the dead to the living animal and, more particularly, from obtaining and distributing the products of the dead animal to securing and selectively maintaining the most important product of the living animal—its progeny. This process, while differing in particulars from species to species, manifests itself in both of the following ways: (1) in structural transformations in the socio-economic dimensions of the human societies which interact with the living animals, and (2) in changes in the behavior and eventually in the morphology and physiology of the animals undergoing domestication.

Some have argued that no discontinuity in human-animal relationships is to be expected between hunting and pastoral societies (e.g., Higgs and Jarman 1969, Jarman and Wilkinson 1972, Hecker 1982). Thus, domestication is seen as an elaboration of the predator-prey relationship, the ultimate result being that herding instead of hunting is counted on to ensure a dependable and renewable source of animal products with a minimum of energy expenditure and risk. Although this approach to understanding domestication has heuristic value, it does not deal with the changes in ideology and social structure which accompany the keeping of domestic stock (e.g., Compagnoni and Tosi 1978, Ingold 1980). Furthermore, many faunal analysts tend to overlook the fact that the domestication of bovids and pigs in the Middle East took place in the context of cereal crop cultivation and settled village life (e.g., Mellaart 1975; Redman 1978; Bar-Yosef 1981, 1982, 1987; Gebel 1984; Hole 1987; Henry 1989). All three of these aspects of the "neolithic revolution" reflect a growing concern for property and for its maintenance through time, an attitude which can, and in the Middle East probably did, provide the foundation for social differentiation based on the accumulation of material wealth.

To evaluate claims for animal domestication, one must bear in mind that there is a conceptual difference between ascertaining the presence of domestic animals at a site and determining that a process of local domestication took place. The former involves identifying the end results of the domestication process and includes an implicit contrast (wild/domestic) while the latter involves documenting change through time in both human and animal behaviour as it is reflected in the archaeological record. Such change can be revealed in either static or dynamic fashion. Bökönyi (1969) argues that the presence of the remains of wild, domestic, and transitional forms at a site is good evidence for local domestication. Using these criteria, an assemblage can be considered as a whole so long as one can accept the assumption that variation in the material, in fact, reflects a temporal sequence telescoped into a single horizon. Such "time-averaging" procedures are unavoidable when working with archaeological materials which often must be grouped in order to create statistically usable assemblages. A more dynamic approach, however, is to deal with the material by level, period, or other meaningful temporal unit and to attempt to discern trends over the course of time. Here one is interested not so much in the situation for any given unit, but in the nature of change (or lack thereof) through the sequence. This second approach will be employed below.

In areas where animals could have been domesticated from local wild stock, evidence for the keeping of domesticates has generally been based: (1) on age and sex ratios which change through time or differ from those "found normally in the wild population" (Bökönyi 1969:221) and (2) on morphological changes, whether these be qualitative (e.g., horn core shape) or quantitative (e.g., size diminution). A number of investigators have argued that due to the length of time necessary for morphological changes to take place, the only effective way to document the early stages of the domestication process is through analysis of demographic data perhaps combined with evidence for increasing "human reliance on 'prodomestic' game, by which is meant 'potentially domesticable' (i.e., those animals known to be domestic in later periods)" (Dyson 1953: 662; also, e.g., Ducos 1969, 1978, 1989; Ducos and Helmer 1981; Perkins 1964). Such an approach, however, has potentially serious drawbacks, a fact which Dyson recognized many years ago (1953:662): Since the species and age composition of a given sample is subject to variation due to factors of preservation (accidents, softer immature bones, etc.) and cultural selection resulting from altered eating habits, technology, or hunting territories, this method must be employed with caution.

Another complication arises from the fact that there is no such thing as a "typical" hunting or herding pattern. A herder will tend to follow different culling practices for each of the various products desired from his animals (e.g., meat, milk, hair, traction, security; see Payne 1973, Redding 1981). While these practices will be reflected in faunal assemblages, identification may prove to be a problem for taphonomic reasons and because of the presence of mixed economic strategies. Furthermore. socio-cultural imperatives for killing animals may override economic reasons not to kill them and disease or injury may leave the herder with no choices. As for hunting, there is debate as to whether human predators generally killed whatever they could or practiced some sort of intentional selection (game management). Even under "random-hunting" situations, however, patterns mimicking those produced under game-management or even herding conditions can be expected to occur. Such patterns will reflect seasonal variations in animal behaviour, longer term fluctuations in population demography, the relative accessibility of different ages and sexes, and even the intensity of hunting pressure on the prey population (e.g., Uerpamann 1979).

In sum, while age and sex ratios can provide important information on human-animal relationships, such data cannot justifiably be used as the principal support for an hypothesis of animal domestication or for demonstrating the presence of domestic animals at a site. The most that can be said is that a particular pattern is consistent with a particular interpretation. Again as Dyson (1953: 662) notes: "Such objections may be minimized to a large extent by the repetition of the statistical pattern in a number of sites from a wide area, provided the sample in each case is of adequate size." Documenting patterns over space or trends over time seems a more productive way to proceed than attempting to identify particular configurations by comparing them with those illusionary patterns "found normally" in wild or domestic populations.

With respect to morphological change being an inadequate indicator of the early stages of domestication, Bökönyi (1976:21) has made the following observation: The best evidence for domestication is the appearance of morphological changes . . . in the animals. However, well defined morphological changes do not occur before about 30 generations, according to modern experiments on domestications. The length of a generation is two to three years in small species (dog, sheep, goat, pig) and five to six years in large species (cattle, horse, and so on). Since the earliest domestication goes back as far as 8,000 to 14,000 years, the delay of 60 to 90 or 150 to 180 years in the occurrence of morphological changes is hardly significant (See also Bökönyi 1989). While it is true that, when taken in the aggregate, the faunal remains from a multi-component site are unlikely to span a time frame of less than 200 years, nevertheless, individual strata, even-though they cannot be assigned a date with any great precision, can contain materials deposited in very short periods of time (H.T. Wright, Miller, and Redding 1980). To the degree that it is possible to deal with such strata individually, the absence of evidence for morphological change could be an impediment to identifying the domestication process. Nevertheless, there is one type of potentially recognizable change which can begin to take place as early as the second generation; this is size diminution (Meadow 1989a).

Size diminution accompanied the domestication of bovids and pigs in the Middle East and Europe (summaries include Boessneck and von den Driesch 1978, Uerpmann 1979, Clason 1979, Grigson 1989). Although biological mechanisms for such change have rarely been discussed, it seems likely that, at first, size decrease need not have had any genetic component. Instead, it may reflect only a lower overall level of nutrition available to animals whose freedom of movement was restricted to increasingly overgrazed areas in and around human settlements, Widdowson (1980:7) suggests that while genetics may be of principal importance in determining growth rates in the early stages of foetal development, in later stages nutrition has a major influence on the growth of the foetus. Furthermore she notes that: . . .because the growth rate in the last part of gestation has been slow, the appetite after birth will be set at a level appropriate to the size and rate of growth at the time before birth when the appetite centres in the hypothalmus were developing. The infant or animal that is small at birth takes less food than its larger counterpart and shows no sign of the 'catch-up growth' which is so characteristic of rehabilitation after undernutrition at older ages. Such nutrition-related causes for size diminution could also have been accompanied by natural and even intentional human selection for smaller animals which, just because they were smaller, would have been better able to survive lean periods in marginal environments (Jarman and Wilkinson 1972, Boessneck and von den Driesch 1978). At the same time, forces of natural selection which favored large males are likely to have been eliminated. One or a combination of these processes, especially in the context of restricted populations, would have led to body size reduction, this continuing until a lower plateau was reached. Such a phenomenon would be reflected in faunal remains by an overall decrease in bone dimensions as shown by increasingly smaller extreme and madian measurement values. Of course, size diminution in mammals need not be associated with domestication (e.g., Davis 1981, 1987; Uerpmann 1978; Klein 1986; Pietschmann 1977). In fact, Jordan (1975) discusses a case of decrease over time in the size of red deer (*Cervus elaphus*) in Thessaly, this possibly related to the deer being confined to increasingly marginal areas as the result of the spread of human settlement.

The principal conclusion to be drawn from the above discussion is that multiple lines of evidence must be employed in order to demonstrate the existence of local domestication. Even arguments jointly based on such features as increasing proportions of specimens from selected species, morphological change, size diminution, and changing age/sex ratios, however, are likely to be more compelling if the faunal materials involved come from a single site or group of sites in a small area which span a considerable period of time. This is not to say that a regional approach cannot prove to be of value, but having only uneven data from distant areas for comparison makes interpretation of faunal remains from sites with relatively short occupations that much more uncertain.

MEHRGARH[3]

The site of Mehrgarh, located near the town of Dadhar in the Kachi District of Baluchistan, is one of the few in the Middle East where it is possible to follow the course of cultural development from before 6000 B.C. to about 2500 B.C. (Jarrige and Lechevallier 1979, 1980; Jarrige and Meadow 1980; Jarrige 1981, 1984, 1984a; Lechevallier and Quivron 1981, 1985; Samzun 1988; Samzun and Sellier 1983; Santoni 1989). Furthermore, the sequence continues at nearby sites (notably Nausharo, Sibri, Pirak, and Dur Khan) through the third, second and first millennia B.C. (Jarrige, Santoni, and Enault 1979; Santoni 1980, 1984, 1988; Jarrige 1985, 1986, 1988).

Considered as the "bread basket" of Baluchistan, the north Kachi plain where these and many more sites are situated is the tip of a vast triangular-shaped expanse of gently sloping alluvium with its base on the Indus River 225 km to the southeast. Bordered on the east and west by the high mountains of central Baluchistan, the plain itself lies at elevations of less than 200 m in the transition zone between monsoon-influenced arid subtropical and tropical thorn forest habitats. The area is affected by torrid heat and occasional monsoon-related torrential rains in the summer but is pleasantly mild during the winter when precipitation, which often falls as snow in the mountains, comes to the plain sometimes as heavy showers. Primarily to avoid the effects of cold and damp on their animals, sheep and goat herders from as far away as Afghanistan gather in the Kachi plain during the winter, returning to the mountains in time to avoid the debilitating summer heat. The antiquity of this pattern of transhumance is unknown, although there is evidence from Pirak to suggest that it is at least as old as the 2nd millennium B.C. (Jarrige, Santoni, and Enault 1979; Jarrige 1985). Similarities between materials from highland and lowland sites as well as the nature of the archaeological remains at Mehrgarh itself, however, indicate that some sort of seasonal movement could have considerably greater antiquity, perhaps extending back even before the beginnings of agricultural life in the region.

The most attractive aspects of the north Kachi plain to agriculturalists are the potentially productive alluvial soils and the perennial Bolan and Nari rivers, water particularly from the former being easily diverted for purposes of orrigation. The torrential summer rains which can cause tremendous waterlevel increases in the rivers and destructive flooding also enable villagers to employ traditional methods of flood water farming, these based on the use of stone or earthen dams (*bunds*) to trap water-laden silts which can retain their moisture even though the winter growing season (Raikes 1968). Examination of sections in the site itself and adjacent to it indicate that for some periods of its occupation Mehrgarh was situated in an actively aggrading floodplain affected by periodic floods that left behind layers of silts that interfingered with the archaeological deposits.

Until the discovery in 1977 of aceramic neolithic deposits at Mehrgarh, the only evidence for that stage of prehistory from the eastern margin of the Middle East came from limited cave excavations in Afghanistan (Gar-i-Asp and Gar-i-Mar: Dupree 1964, 1972) and a small sounding in the Quetta valley of Baluchistan (Kili Ghul Mohammed: Fairservis 1956). These materials, while suggestive, were not given much attention by specialists in the area because they were dated by 14C determinations either too late (c. 4200 B.C.: Quetta) to be in the main line of cultural developments in the Middle East or too early (9th to 7th millennium uncalib. B.C.: Afghanistan) to be credible in light of what was then thought about the region (but see Shaffer 1978, Meadow 1990). The Mehrgarh evidence has now changed the picture markedly although the question of an absolute date for the beginning of sedentary life in the region still remains unanswered.

In Mehrgarh area MR3 (Figure 27.1), the Bolan river has cut a c.12 m deep section through the cultural deposits and alluvium. Careful study of this section in areas MR3F and MR3D-Bolan has revealed the presence of a 7-8 m thick aceramic neolithic mound (Period IA) capped and ringed by later deposits containing coarse, chaff-tempered ceramics (Periods IB and IIA) which are similar to those from the mid-sixth millennium B.C. in south-eastern Iran (Jarrige and Lechevallier 1980; Jarrige 1987, 1988a; Lamberg-Karlovsky and Beale 1986). The deepest levels have been reached in three locations (MR3S, MR3T, and MR3D) with the total area excavated being about 75 sq m, a very small proportion of the at least three to four hectares once covered by early aceramic deposits. The precise relationships between the strata of the two soundings (MR3S and MR3T separated by about 45m) and between the soundings and the Bolan section (MR3D, about 20 m northeast of MR3S) have not been defined, although it appears that all deposits of M3T (levels 1-11) are aceramic while there are only seven aceramic levels in MR3S (IA.1-7) capped by seven levels of deposits with occasional sherds of a coarse, chaff-tempered ceramic (IB. 1-7). This configuration can be explained by nothing that Trench MR3S is located to one side of the center of the aceramic mound, which itself can best be conceptualized as a truncated cone surrounded and eventually covered by later ceramic neolithic deposits (first IB, then IIA, then IIB) interfingering with alluvial sediments. The stratigraphic situation became clear with the excavation of the Bolan section (MR3D) where the 10 levels of Period IA are covered on the south side by five steeply sloping levels of Period IB. (see Lechevallier and Ouivron (1985) for sections and further discussion).

In addition to faunal materials, the aceramic and ceramic neolithic strata of Mehrgarh have yielded a wealth of other archaeological remains. Notable are the mud-brick architecture, which by Period IIA includes elaborate multicompartmented structures probably used for grain storage (Figure 27.1); a rich lithic assemblage including blades with sickle sheen some of which have been found set in bitumen (Lechevallier 1980, 1984; Vaughan *et al.* 1987); ground stone and bone artefacts; grinding stones; and 166 graves (85 of Period IA/early IB from the soundings, 81 of later Period IB/IIA), many with durable grave goods including such imported materials as marine shells, turquoise, and lapis lazuli (Barthelemy de Saizieu 1988, in press). By Period IB, a few sherds of coarse, chaff-tempered pottery are found. These are more frequent in Period IIA and are replaced in Period IIB by a relatively fine burnished red ware. Finally, there is a wealth of floral evidence in the form of charred remains and thousands of impressions in mud brick. Dominating the floral assemblage of Period I is naked six-row barley (*Hordeum vulgare* subsp. *vulgare* var *nudum*) more than 90 percent of the seeds and imprints identified) with hulled six-row barley (*H. vulgare* subsp. *vulgare*), two-row barley (*H. vulgare*-subsp. *spontaneum* and *H. vulgare* subsp. *distichum*), einkorn (*Triticum monococcum*), emmer (*T. turgidum* subsp-*dicoccum*), and hard wheat (*T. turgidum cf.* conv. *durum*) present in greatly reduced amounts (Costantini 1984).[4] The only non-cereals so far identified for the aceramic

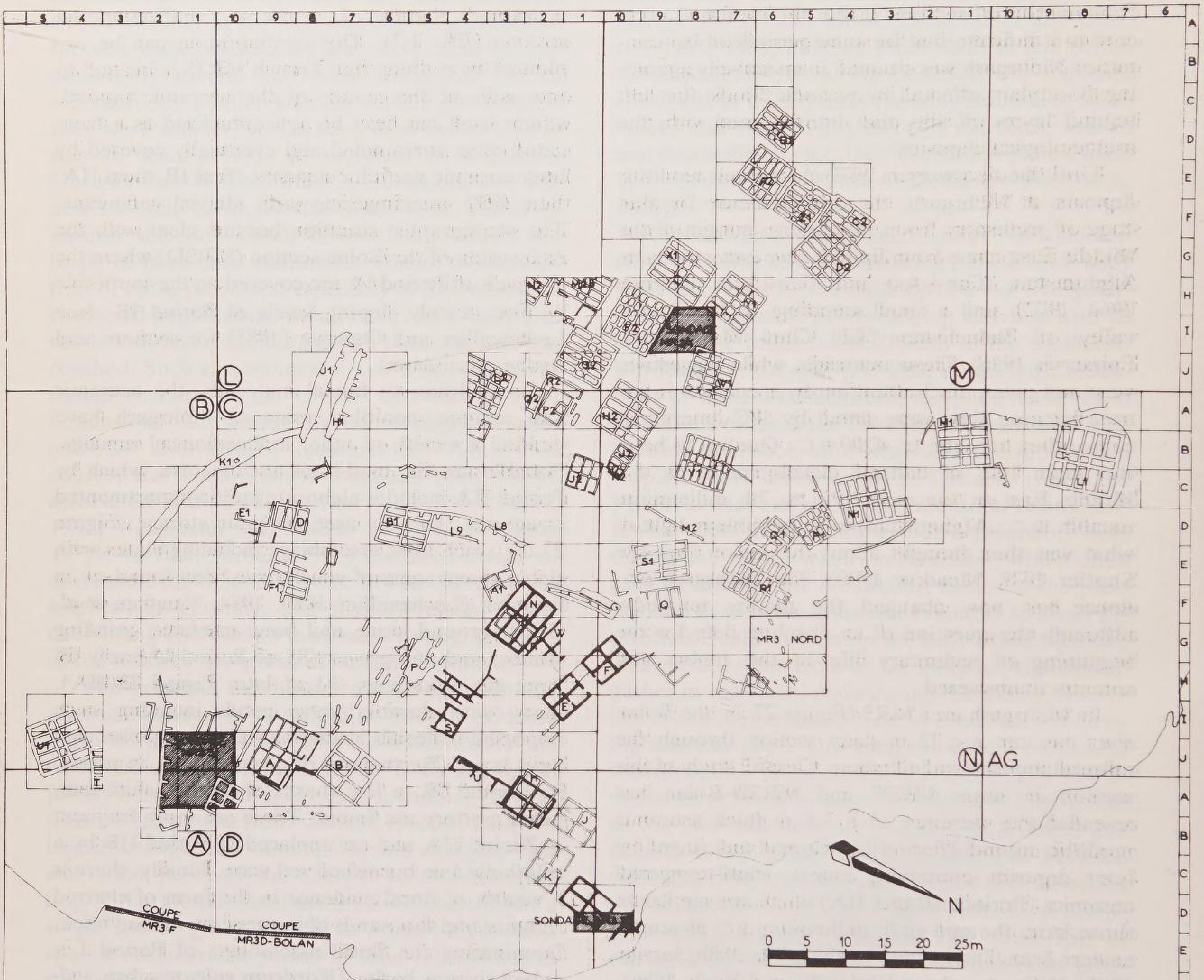
MEHRGARH 3 MR3-MR3/4
1976-1985
gonzaque quivron 1985
MR3 NORD
SONDAGE
COUPE MR3 F
COUPE MR3D-BOLAN
L
B C
A D
M
N AG
N
0 5 10 15 20 25m
6480 m2

Fig. 27.1. Plan of Mehrgarh zone MR3-4. Drawn by Gonzaque Quivron. Previously published in Meadow (1989b).

include jujube (*Zizyphus* sp.) and date (*Phoenix dactylifera*), the latter represented by single stones in an upper level of Period IB and in Period IIB (Costantini 1985).

The cereal complex of Mehrgarh, present from the earliest levels of the aceramic (MR3T level 2), raises some interesting qustions not the least of which is the presence of domestic wheats so far to the east of the known distribution of wild einkorn and emmer (Harlan and Zohary 1966, Renfrew 1969, van Zeist 1977, Harlan 1977, Zohary and Hopf 1988, Zohary 1989), Most of the earliest remains of morphologically domestic wheats in Western Asia seem to date to the first half of the 8th millennium B.C. (non-calib.), but the analysis of material from a single site can still change the picture markedly. This is well attested by the finding of charred grains of free threshing wheats in the late 8th /early 7th millennium B.C. (non-calib.) levels at Tell Aswad near Damascus (van Zeist and Bakker-Herres 1979), a millennium earlier than they had previously been recorded in the Near East (at Ramad, Can Hasan III, and also at Knossos X; see Harlan 1977, van Zeist 1977).

There are difficulties in the specific identification of free threshing wheats such as *Triticum turgidum cf.* conv. *durum* or *T. aestivum* on the basis of the morphology of archaeobotanical finds. Consequently, there is uncertainty as to the botanical origin of the material from any given site—whether directly from *T. turgidum* subsp. *dicoccum* in the case of durum wheat or from a series of mutation and crosses between emmer and the goats-face grass *Aegilops squarrosa* in the case of bread wheat (e.g., Renfrew 1973, van Zeist 1977, Zohary and Hopf 1988). The distribution of goats-face grass includes much of the Iranian plateau and what are today southern Central Asia, Afghanistan, and western Pakistan; it overlaps with the distribution of wild emmer only in the Caucasus (Renfrew 1973, Zohary and Hopf 1988). The necessary conditions for an emmer x *Aegilops* cross, however, could have been met anywhere the latter appeared as a weed in fields where emmer was cultivated. Therefore, *T. aestivum* could have originated as easily in the Pakistan area as in northwestern Iran and, in fact, it seems quite likely that the free threshing wheat of the west was *T. turgidum cf.* conv. *durum* and that of the east *T. aestivum*. Van Zeist notes that "*T. durum* is well adapted to the Mediterranean climate, whereas *T. aestivum* is a crop plant from more humid, temperate climatic conditions" (van Zeist and Bakker-Heeres 1979: 164). He also observes, however, that "bread wheat could not have come into existence until 6000-5000 B.C. after wheat agriculture had reached the distribution area of *Aegilops squarrosa*."

Here lies the significance of the botanical material from the aceramic levels of Mehrgarh. For even if the beginning of period I at the site dates back only to the end of the 7th millennium B.C. the presence of fully developed hard, free-threshing, wheat suggests that the cultivation of wheat had been practiced for some time before 6000 B.C. east of Greater Mesopotamia.

There are eight radiocarbon determinations from aceramic neolithic levels at Mehrgarh (Period IA), thirteen from the early ceramic neolithic (Period IB-IIA) and three from the later ceramic neolithic (Period IIB). These are listed in Table 27.1 and shown graphically in Fig. 27.2. There is considerable consistency in these determinations if one eliminates dates 3, 4, 5, 7, and 8 as being too late and 6, 11, 20, Beta 1719, and Ly. 1946 as being too early. The "late" dates are, in fact, acceptable estimates of age for Periods IIA and IIB, remains of which immediately overlie or surround the aceramic deposits. The very early dates probably reflect bitumen contamination, although the three somewhat older determinations, one each from IA (Beta 1721), IB (Ly 1950, a rerun of the sample providing 1946), and IIB, (Beta 1720) can be interpreted to suggest a chronology beginning as early as the 8th millennium B.C. (uncalibrated). A conservative interpretation of the determinations, however, would date Period IA to c.6300-5300 (calibrated) B.C. IB to c. 5300-4800 B.C. IIA to c. 4800-4300 B.C. and IIB to 4300-4000 B.C. Jarrige (e.g., 1987) has argued that the early ceramic neolithic at Mehrgarh (IB) begins at about the same time as on the Iranian plateau (certainly by c. 5500 B.C.) and that the aceramic neolithic must begin before the ceramic neolithic of Djeitun (southern Turkmenistan) which is dated to the end of the seventh millennium B.C. (e.g., Kohl 1984).

Inconsistent series of 14C determinations are well known from alluvial areas in the Middle East (Hole 1977, H.T. Wright 1980, Evin 1981). Unfortunately, the bone from the aceramic levels is almost completely lacking in collagen and shows

Table 27.1: Mehrgarh radiocarbon determinations, Periods I-II

	Period IA	dates bp	Calibrated BC (one sigma range)*	Provenience
	MR3T, Levels 2.7 (early IA, in stratigraphic order from earliest to latest)			
1	Beta 1408	6925+/-80	5953 (5749) 5660	MR3T 550
2	Beta 1407	7115+/-290	6219 (5980) 5650	MR3T 545
3	Ly. 1948	5720+/-730	5380 (4653, 4648, 4581) 3780	MR3T 537
4	Ly. 1949	5530+/-180	4577 (4360) 4167	MR3T 537
5	Ly. 1947	5830+/-190	4937 (4735) 4470	MR3T 536
6	Beta 7316	9385+/-120	(7840-7590***)	MR3T 534
	MR3D, Level 2 (early IA):			
7	Beta 7316	5990+/-70	4993 (4931, 4928, 4901) 4793	MR3D D9E, niv.2
	MR3S, Level 3 (early IA):			
8	Beta 2686	5860+/-70	4838 (4777) 4684	MR3S 811
	Period IB			
9	Lv. 994	6290+/-70	5326 (5238) 5219	MR3 Bolan foyer N
10	Lv. 993	6110+/-90	5217 (5190, 5058) 4906	MR3 Bolan foyer S
	average Lv. 993-994		5238 (5226) 5088	
	Beta 1719	13340+/-125	n.a.	MR3 DIOA, niv. 5
	Ly. 1946**	32650+/-3000	n.a.	MR3 AIA 433
11	Ly. 1950**	8440+250	n.a. (7005-6485***)	MR3 AIA 433
12	Lv. 908	6090+/-70	5203 (5046, 5019, 5004) 4906	MR3 loc. II, cendres
13	Lv. 907	6020+/-80	5054 (4937, 4917, 4907) 4809	MR3 AIA
14	Lv. 909	5940+/-100	4940 (4892, 4887, 4841) 4727	MR3 103
15	Lv. 906	5950+/-65	4937 (4894, 4883, 4845) 4782	MR3 D10A
16	Lv. 910	5880+/-100	4900 (4782) 4680	MR3 AIA
	average Lv. 906-910		4939 (4931, 4929, 4921, 4901) 4845	
	Period IIA			
17	Beta 7315	5620+/-100	4653 (4465) 4360	MR3/4 M91, Bat. F
18	Beta 2688	5490+/-70	4459 (4350) 4240	MR4 B61, niv. 3,813
19	Beta 7314	5400+/-90	4351 (4318, 4285, 4246) 4049	MR3/4 F2, loc. 4
	Period IIB			
20	Beta 1720	7115+/-120	6090 (5980) 5930	MR4 F6B 5
21	Lv. 1945	5360+/-310	4510 (4235) 3816	MR4 F5F, niv. 4
22	Beta 2687	5240+/-110	4233 (4037, 4014, 4008) 3970	MR4 F5F, niv. 4,812

ID numbers used in Figure 27.1.

*bp determinations calibrated to B.C. dates using University of Washington, Quaternary Isotope Laboratory, Radiocarbon Calibration Program 1987, Revision 2.0. See *Radiocarbon* 28 (1986).

** Ly. 1950 is a rerun after additional pretreatment of the sample that provided Ly. 1946.

*** uncalibtrated based on 5730 half-life.

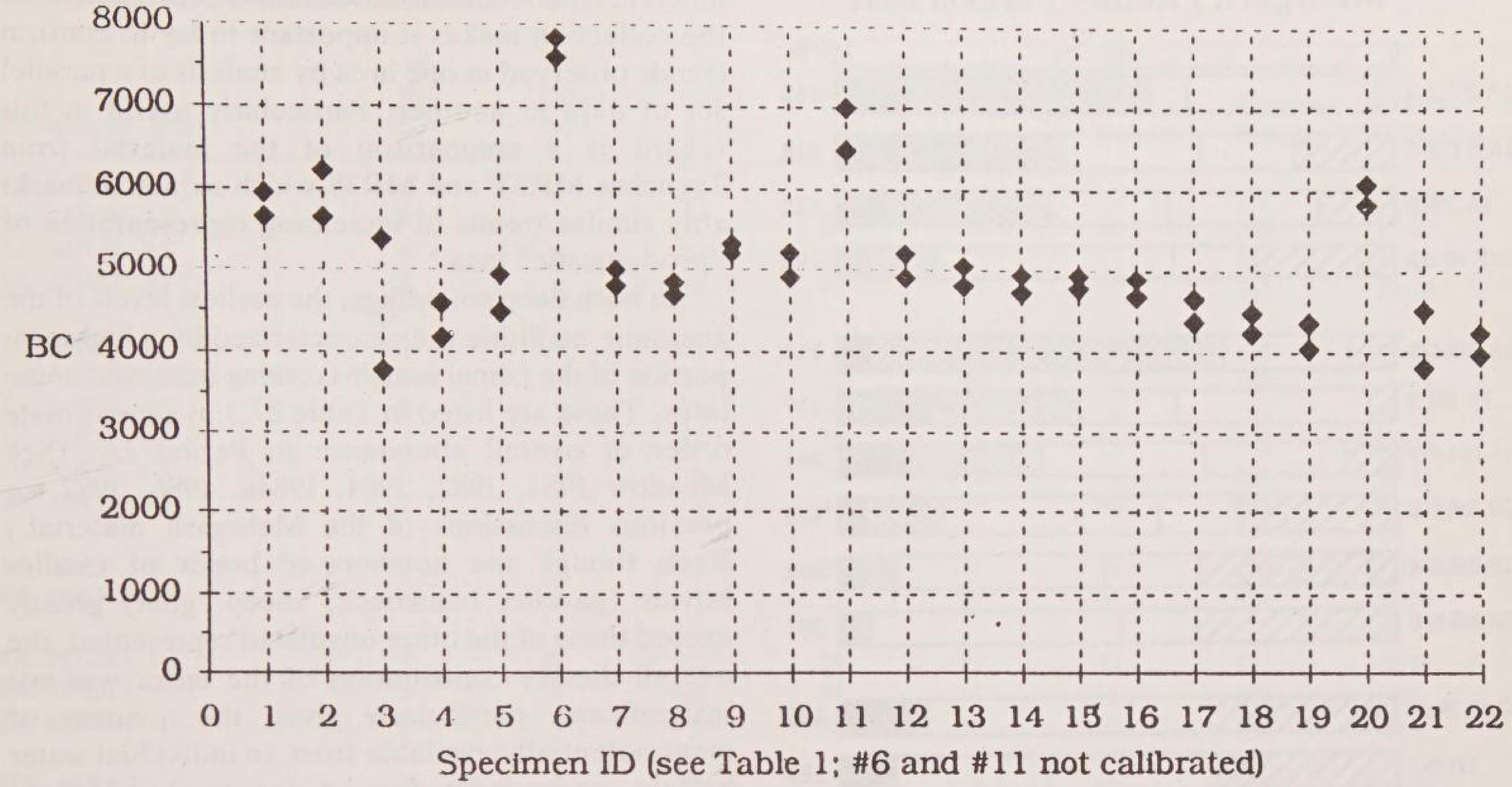

Fig. 27.2. Calibrated radiocarbon dates from Mehrgarh, Periods I-II (1 sigma range).

considerable mineral replacement, making it impossible to date using large-sample techniques and difficult even with small-sample procedures. In addition, very little carbonized material was encountered during excavations of the aceramic deposits and none is available for accelerator dating. Should excavations at MR3 be resumed in the future, a careful program of collection and dating needs to be undertaken. Even so, with the presence in the earliest levels of the free-threshing wheat and, as described below, domestic goats a mid-seventh millennium B.C. date for the beginning of the aceramic neolithic at Mehrgarh appears appropriate, although it could also have been somewhat earlier.

Following ceramic neolithic Period IIB at Mehrgarh are a sequence of deposits covering the span from at least 4000 B.C. to about 2500 B.C. These have been divided into five periods (III-VII). Of concern for this paper is Period III which lasts until the fourth quarter of the fourth millennium. Remains dating to this period cover an area of approximately 75 hectares within which excavations have revealed differentiated activity areas. These include compartmented storage structures similar to (but more elaborate than) those of IIA and IIB, a ceramic manufacturing zone, areas of semi-precious stone working, domestic structures, and a graveyard. The faunal remains discussed below come from an area of domestic structures (Meadow 1989b).

THE FAUNAL REMAINS

Results of analysis of the faunal remains from Mehrgarh Periods I-III are summarized in Figure 27.3. The bars show the relative abundance of the bones of different taxa from 18 divisions of the archaeological sequence for Periods I-III at Mehrgarh. Each bar represents 100 percent of the standardized bone counts[5] from a group of occupational deposits. The top four are from Trench MR3T (aceramic Period IA, levels 1 to 11), the next six from Trench MR3S (aceramic Period 1A, levels (1-7 and ceramic Period IB, levels 1-6), the following two from area MR3C (late Period IA and Period IB, just below the surface of the site), the next three from the section cutting in MR3D

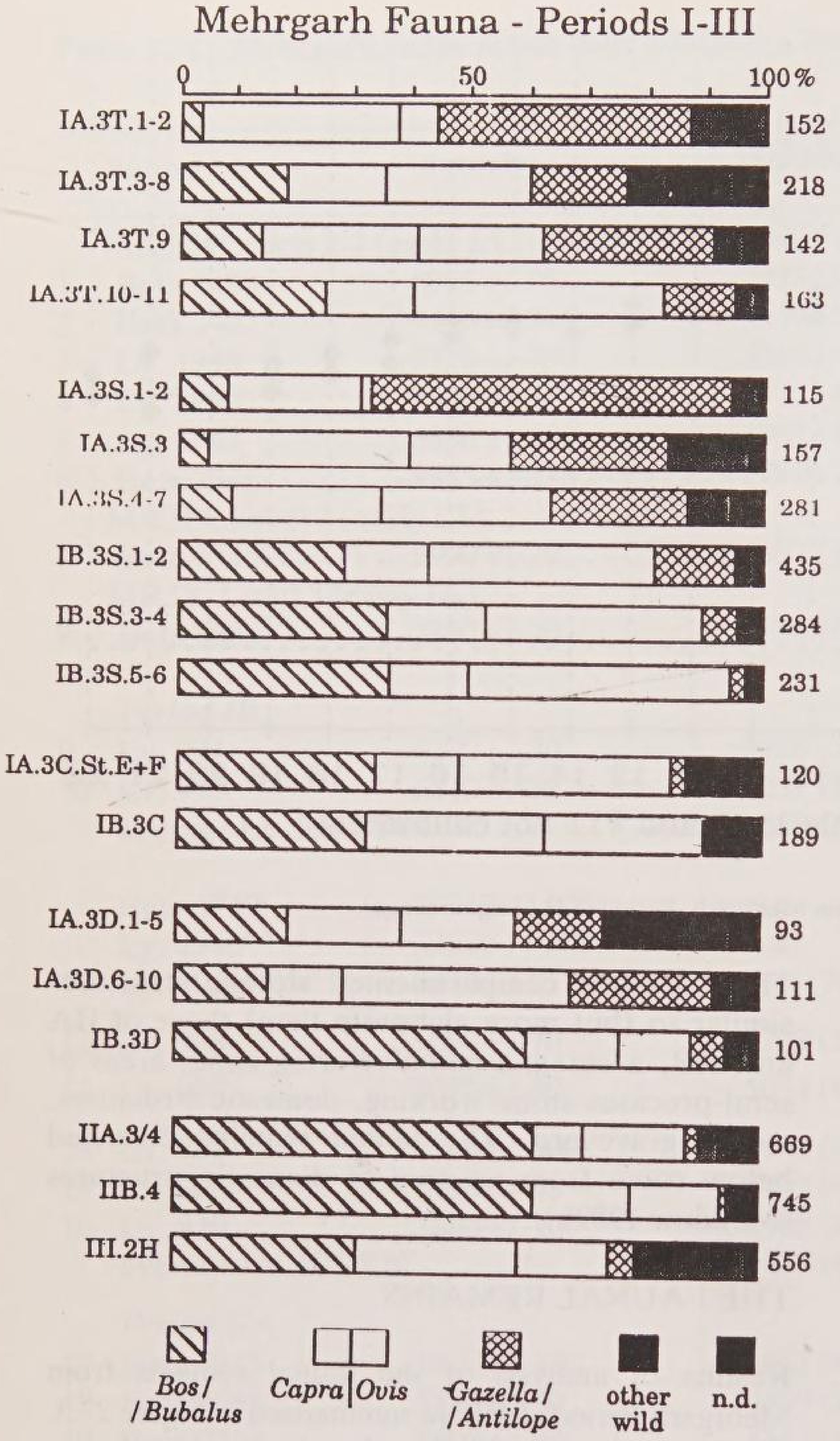

Fig. 27.3. Mehrgarh Fauna—Period I-III

(Period IA, levels 1-10 and Period IB, levels 1-5), and the last three from areas MR3/4, MR4, and MR2 (Periods IIA, IIIB, and III, respectively).

The percentages which the bars in Figure 27.3 represent are presented in Table 27.2. Given small sample sizes and the resulting need to combine assemblages from sets of adjacent strata one must look to trends in the data and not at the actual percentages themselves to provide insights into faunal exploitation practices. In addition, the possibility of different taphonomic histories for different segments of the collection makes if important to try to confirm trends observed in one area by analysis of a parallel set of data in another. Particularly useful in this regard is a comparison of the material from Trenches MR3T and MR3S which exhibit remarkably similar trends of increasing representation of "prodomestic" taxa.[6]

In both deep soundings, the earliest levels of the aceramic neolithic are characterized by a high proportion of the faunal remains coming from wild ungulates. These are listed in Table 27.3 in approximate order of overall abundance in Period IA. (See Meadow 1981, 1982, 1984, 1984a, 1986, 1987 for previous discussions of the Mehrgarh material.) Even though the numbers of bones of smaller bovids (gazelle, blackbuck, sheep, goat) greatly exceed those of the other ungulated represented, the overall dietary contribution of the latter was not insignificant, particularly given the quantity of meat potentially available from an individual water buffalo, ox or large deer. A few bones of carnivores, rodents, fish (principally silurids), birds, and river turtle (*Trionyx gangeticus* or *Chitra indica*) have also been identified from Period I deposits, but the early inhabitants of Mehrgarh seem to have paid little attention to these taxa, instead hunting "big game" animals whose preferred habitats included the hills, the plains, and river, lake, or swamp margin. Some of the wild ungulates continue to be represented throughout the occupation of the site including gazelle, blackbuck, onager, and boar. Gazelle and especially wild boar are still present in the area today as are catfish and turtles in the rivers. The disappearance of the other taxa from the region and even from the area of present-day Pakistan is almost certainly due to hunting by humans for meat, sport, or protection of crops and to environmental change, this again largely due to the agricultural, pastoral, and wood cutting activities of past and present human societies. The relations of these processes to animal domestication on the eastern margin of the Middle East will be noted below.

Later levels of the aceramic neolithic in both MR3S and MR3T show a decline in the proportion of remains coming from animals other than sheep, goats and cattle. By the end of Period IA (IA.MR3T.10-11, IA.MR3C.St.E+F) and the beginning of Period IB (IB. MR3S.1-2), more than

Table 27.2: Mehrgarh fauna—Period I-III

Phase. area. level	% Not ID	% Other Wild	% Gaz./ Antil.	% Ovis	% Capra	% Bos Bub.	Standard Counts	Counts Ovis: Cap.
IA. MR3T. 1-2	1	13	43	7	34	4	152	3:16
IA. MR3T. 3-8	6	18	17	24	17	18	218	17:12
IA. MR3T. 9	4	5	29	21	27	14	142	13:16
IA. MR3T. 10-11	2	3	12	42	15	25	163	29:10
IA. MR3S. 1-2	2	4	61	2	23	9	115	1:15
IA. MR3S. 3	3	13	27	17	34	5	157	6:12
IA. MR3S. 4-7	6	7	23	29	26	9	281	28:25
IB. MR3S. 1-2	2	3	14	38	14	29	435	64:24
IB. MR3S. 3-4	3	2	6	36	17	36	284	32:15
IB. MR3S. 5-6	2	2	3	44	13	36	231	36:11
IA. MR3C. St. E=F	3	10	3	36	14	34	120	17:7
IB. MR3C	3	6	1	27	30	33	189	17:19
IA. MR3D. 1-5	5	22	15	19	19	19	93	7:7
IA. MR3D. 6-10	5	4	24	39	13	16	111	12:4
IB. MR3D	2	4	6	12	16	60	101	3:4
IIA. MR3/4	7	3	2	17	9	62	669	60:29
IIB. MR4	5	1	1	15	17	62	745	47:52
III. MR2H	2	19	4	15	28	32	556	28:50
						total	4762	

80 percent of all of the faunal remains come from the three "prodomestic" genera (Figure 27.3). In particular, the representation of cattle and sheep remains rises dramatically, with both animals generally being much better represented than goats during Periods IB/IIA. Indeed, in many contexts of the ceramic neolithic, cattle bones make up well over half of the faunal collection (IB.3D, IIA.3/4, IIB.4). As has been noted in a previous study, however, there is considerable variability in taxonomic representation between contexts (Meadow 1989b). This is thought to be due to differential deposition and preservation of faunal remains. Nevertheless, the large numbers of cattle bones, particularly in dump deposits of Period II, are not paralleled in dump deposits of any other period at Mehrgarh, although they are known from similar contexts at both Balakot (Meadow 1979) and Jalilpur (Meadow 1988) in later periods.

Another special situation is represented by the remains of Period III. The relatively high proportion of wild fauna ("other wild") reflects the presence of numerous limb segments from *Equus hemionus*. Bones of this wild equid appear to have been prized for making bone tools, and their concentration in certain loci in and around the domestic structures of Period III probably reflects this activity (Meadow 1989b). Even so, it is worth comparing Period III with Period II and noting the decrease in cattle bones in relation to those from sheep and goat, as well as the relatively large numbers of goat bones in relation to those from sheep. The sheep to goat ratio is one that varies considerably at Mehrgarh through time, although generally speaking goat remains tend to be more frequent than those from sheep in periods III-VII.

The increasing dominance of bones from cattle, sheep, and goats through the course of Period I at Mehrgarh suggests a growing dependence by the aceramic neolithic inhabitants on animals keeping and herding. One may ask, however, whether this change was a phenomenon based on the exploitation and eventual domstication of local wild stock or on the importation of breeding stock with a history of having been kept elsewhere. So far, no aceramic deposit has yielded sheep, goat, or cattle horncores or skull fragments complete enough to unambiguously characterize the animals of the

Table 27.3. Wild ungulates represented in the faunal remains from Mehrgarh Period IA, in approximate order of abundance

Gazella bennetti	chinkara (gazelle)
Ouis? orientalis	wild sheep
Capra? aegagrus	wild goat
Cervus duvauceli	barasingha (swamp deer)
Boselaphus tragocamelus	nilagi (blue bull)
Bos? namadicus	wild cattle
Bubalus bubalis	water buffalo
Axis axis	chital (spotted deer)
Equus hemionus	onager
Antilope cervicapra	blackbuck
Sus scrofa	wild boar
Elaphas maximus	elephant (single specimen)

Table 27.4: Standard dimensions used to compile figures 27.4-27.7

Dimension	*Bos indicus* (zebu)	*Ovis* (sheep)	*Capra* (goat)
Scapula (BG)	58.7	22.0	24.7
Humerus (BT)	89.5	29.5	34.2
Radius (Bp)		33.5	35.5
Radius (BFp)	87.1		
Radius (Bd)	84.3	31.0	33.2
Ulna (BPC)	56.3	19.0	
Ulna (DPA)			29.5
Radial Carpal (L)	34.0		
Intermediate Carpal (L)	31.4		
Ulnar Carpal (L)	36.7		
Carpal II+III (GB)	38.6		
Carpal IV (B)	34.1		
Metacarpal (Bp)	65.7	25.0	27.3
Metacarpal (Bd)	68.9	26.5	30.5
Pelvis (LA)	80.5		
Femur (DC)	54.9	21.0	23.0
Tibia (Bd)	71.6	26.5	
Tibia (Dd)			21.7
Lateral malleolus (GD)	40.3		
Astragalus (GLI)	75.4		
Astragalus (Bd)	51.4	19.6	20.8
Central + IV Tarsal (GB)	66.7		
Tarsal II+III (D)	40.6		
Metatarsal (Bp)	54.4	22.5	23.0
Metatarsal (Bd)	64.3	26.0	28.5
Phalanx I anterior (GLpe)	68.7		
Phalanx II anterior (GL)	44.0		
Phalanx I posterior (GLpe)	69.0		
Phalanx II posterior (GL)	45.2		
Phalanx I average (GLpe)	68.9		

Notes: all dimensions in mm. L = Length, B = Breadth, D = Depth. For measurement definitions, see von den Driesch (1976) and Stampfli (1963). *Bos indicus* (Museum of Comparative Zooloty 51755) adult male, collected by S.J. Olsen, Ft. Meade, FL. USA, 1957, measured by R.H. Meadow (Meadow 1986); *Ovis orientalis* (Field Museum of Natural History 57-951), adult female from western Iran; *Capra aegagrus* British Museum [Natural History] 653M and 653L2) average of adult male and adult female from the Taurus mountains; sheep and goats measured by H.-P. Uerpmann (Uerpmann 1979, Table A-3).

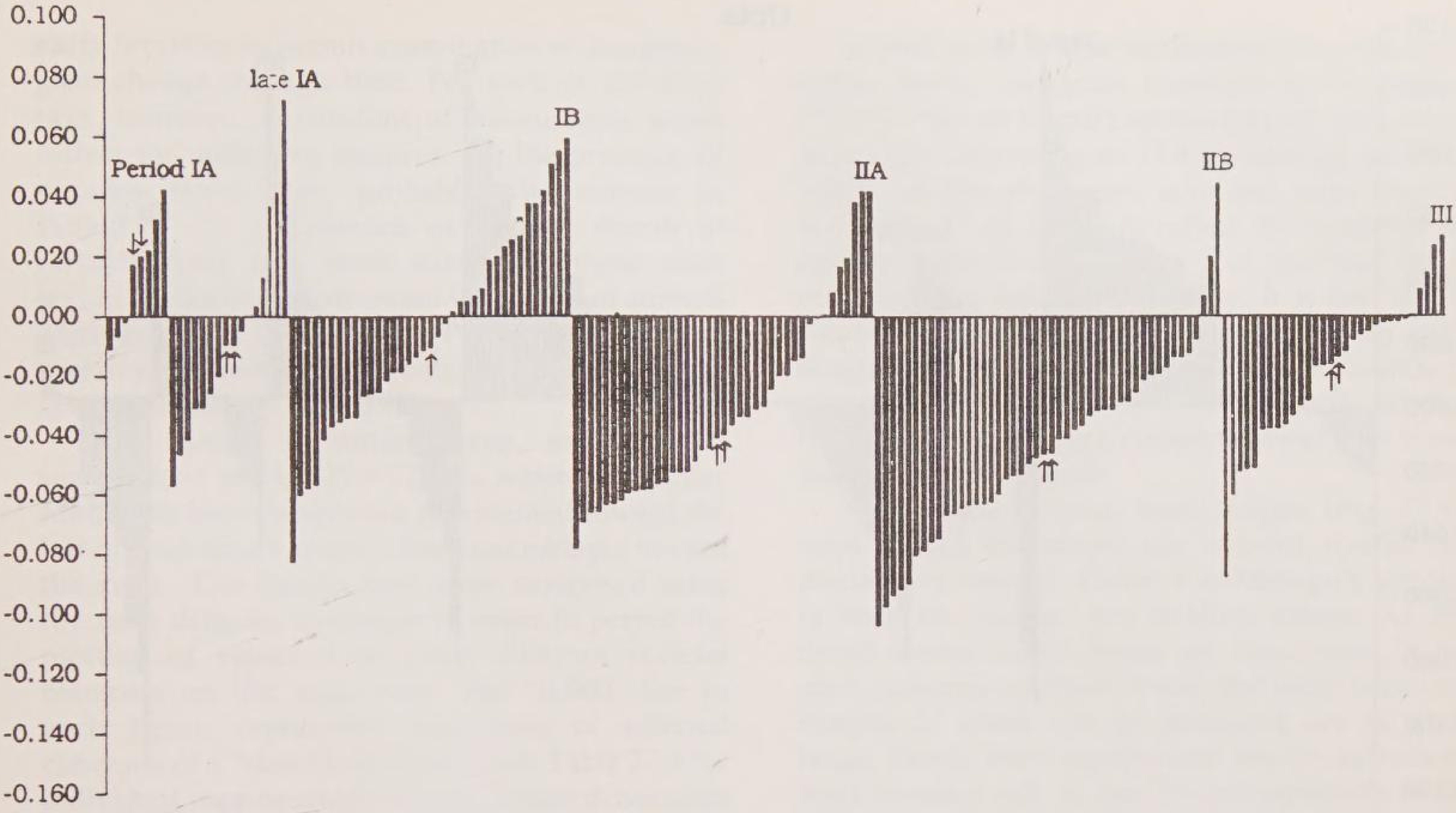

Fig. 27.4. Size distribution of cattle (*Bos.* sp.) bone lenths from Mehrgarh plotted according to the difference of logarithms technique (see text).

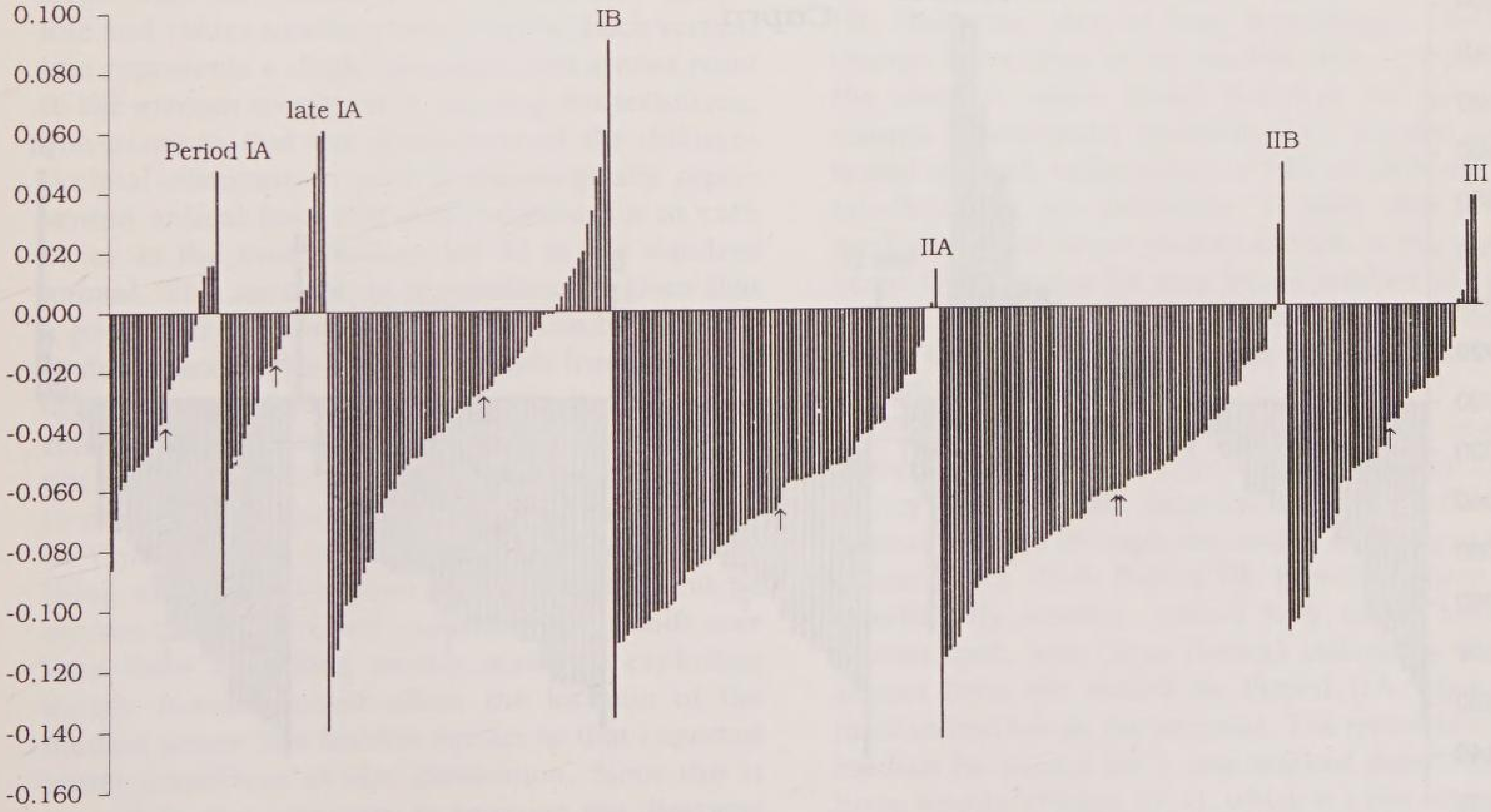

Fig. 27.5. Size distribution of cattle (*Bos.* sp.) bone breadths and depths from Mehrgarh plotted according to the difference of logarithms technique (see text).

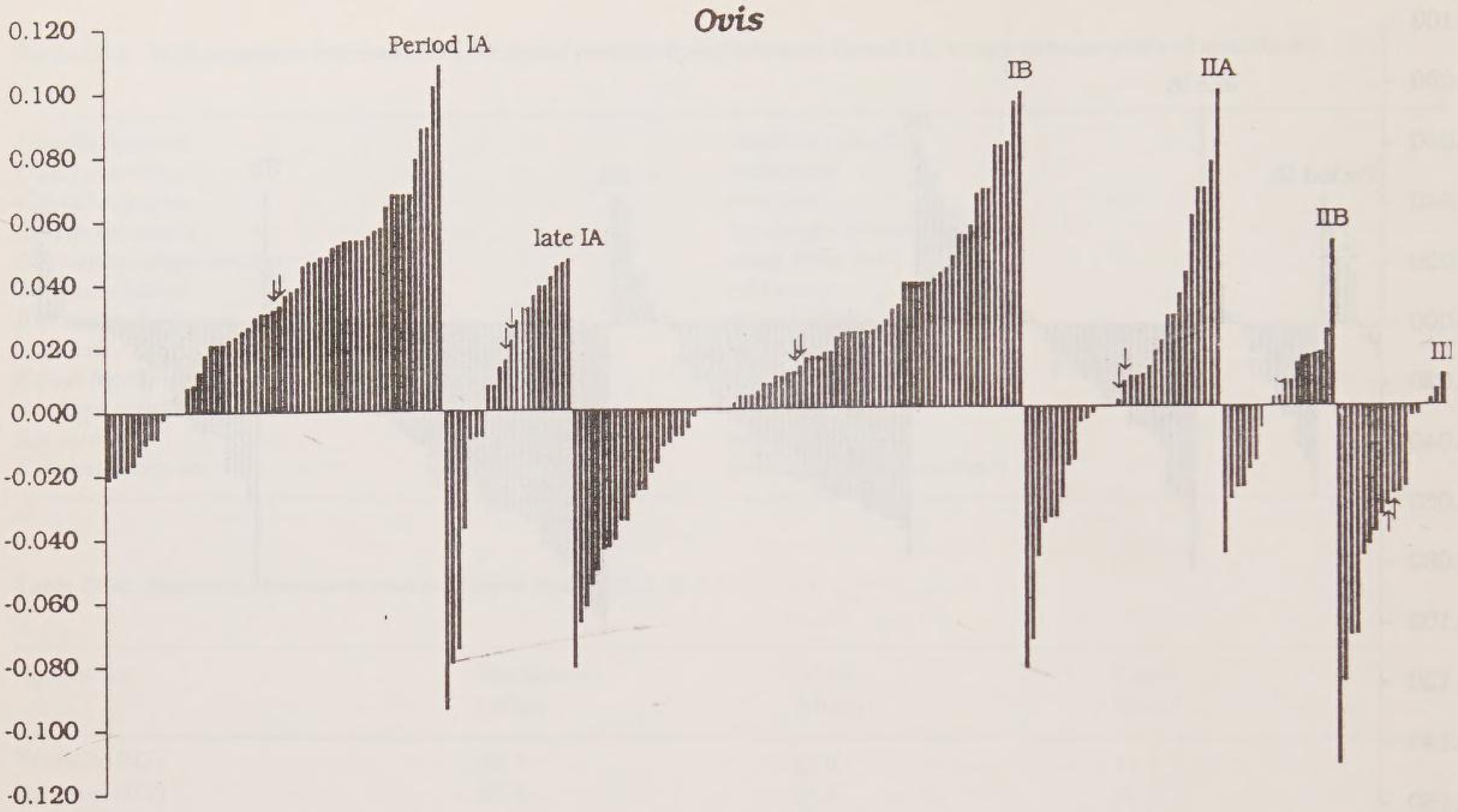

Fig. 27.6. Size distribution of sheep (*Ovis* sp.) bone breadths and depths from Mehrgarh plotted according to the difference of logarithms technique (see text).

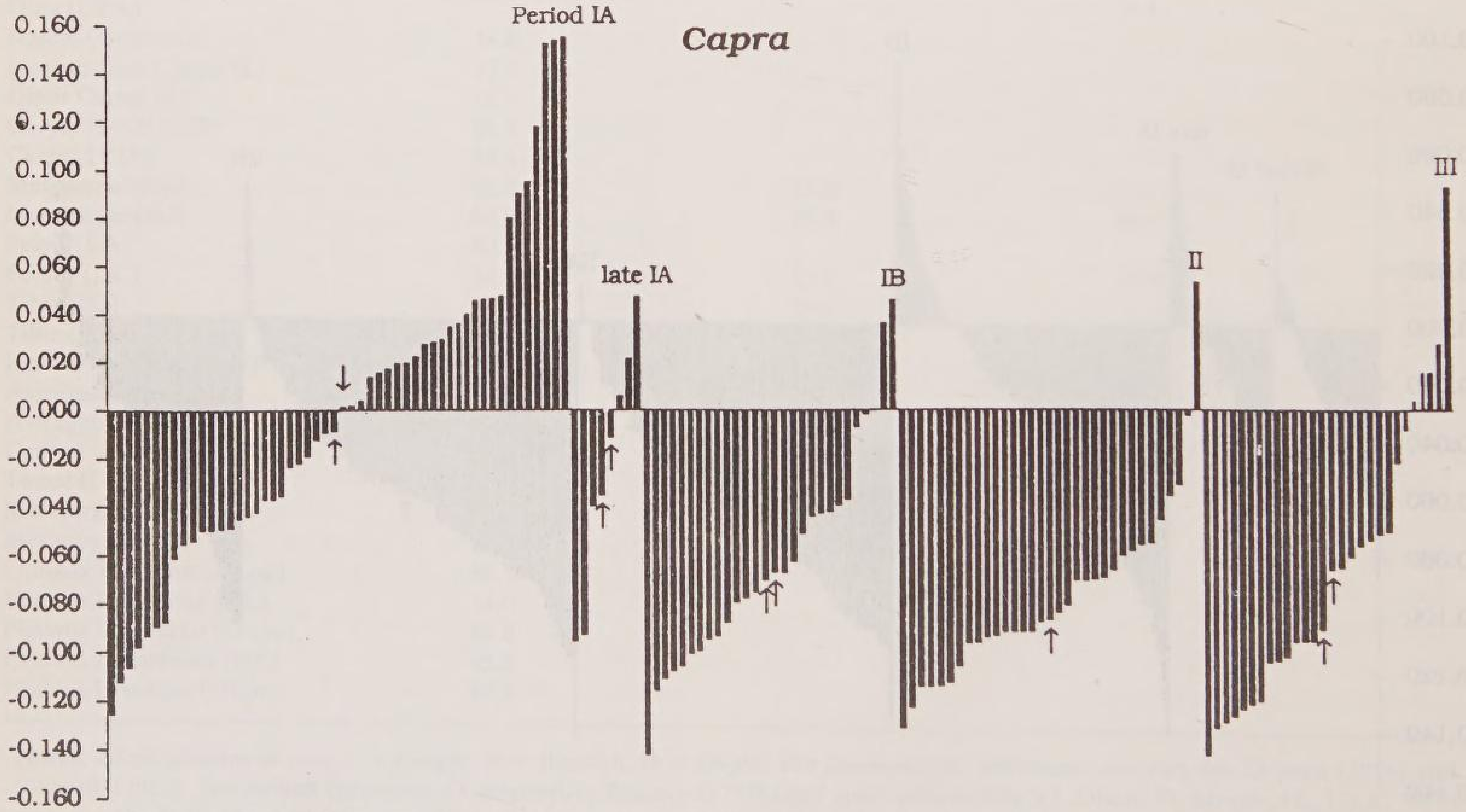

Fig. 27.7. Size distribution of goat (*Capra* sp.) bone breadths and depths from Mehrgarh plotted according to the difference of logarithms technique (see text).

early levels or to permit examination of morphological change through time. For each of the three taxa, however, dimensions of measureable bones reflect the following features: (1) the presence of remains from large, probably wild animals in Period I; (2) an absence or relative dearth of remains from very small animals in these same levels; (3) an overall decrease in the size of animals exploited from Period I into Period II; and (4) an end to size diminution in goats and cattle by Period II and in sheep by Period III.

Size change in cattle, sheep, and goats is summarized in Fig. 27.4-27.7 in which the earlier Mehrgarh assemblages are represented toward the left of each figure and the later assemblages toward the right. The figures have been composed using the ratio diagram technique in order to permit the plotting of values from many different skeletal elements on the same axis. The "0.000"-line in each figure represents dimensions of selected elements of a "standard animal" (see Table 27.4 for individual measurement values). These dimensions along with the corresponding ones from the archaeological specimens are converted into logarithms and subtracted one from the other, with values larger than the standard plotted above the "0.000"-line and values smaller plotted below. Each vertical line represents a single specimen, and arrows point to the median specimen(s). In using this technique, one assumes that the dimensions of the different skeletal elements in each archaeologically represented animal bear the same relationship to each other as the same dimensions do in the standard animal. This assumption is questionable given that a good deal of individual variation can be expected to occur, and, in fact, measurements from articulating archaeological specimens can be shown to relate differently to the standard. This objection is not fatal, however, since the technique is used only to reveal trends and not to identify the sex or state of domestication of individual specimens, something which can be done only on an element by element basis. Still, one can argue that a shift over time from exploiting mostly males to exploiting mostly females would affect the location of the median arrow in a fashion similar to that expected under conditions of size diminution. Since this is true, it is also necessary to examine the diagrams for trends in the extreme dimensions, i.e., those reaching farthest above and below the "0.000"-line.

A final point is that the dimensions plotted for cattle, sheep, and goats (respectively) in Figures 27.5-27.7 are all breadth measurements, while those plotted for cattle in Figure 27.4 are all length measurements (of the phalanges, talus and some carpals: see Table 27.4). Breadths reflect the weight of the animal, while lengths of the foot and long bones represent the height. If possible, it is best not to combine the two kinds of dimensions in ratio diagrams. Only for cattle, however, is it possible to plot any length dimensions, because only for that taxon are there enough complete lower limb bones preserved or recovered.

In the case of cattle bone lengths (Fig. 27.4), even though the sample size is small, overall size diminution through Period I at Mehrgarh appears in both the median and smallest values. As was noted above, cattle bones are uncommon in the early aceramic neolithic levels, and those bones the lengths of which can be measured are all quite large. Bones from significantly shorter individuals start to occur only in late IA and especially in IB, with the shift to smaller indviduals largely complete by ceramic neolithic Period IIA. Furthermore, whereas specimens with very large dimensions continue to be found in significant numbers into Period IB, these are rare in later assemblages. Such a change in location of the median without a shift in the smallest values could, however, be due to a change in husbandry practices. This remains to be tested through examination of kill-off patterns and tabulation of sex indicators. A later shift of the median toward larger (taller) animals in the assemblage from Period III may be an artefact of small sample size, although an increase is also present, albeit to a lesser extent, when bone breadths are considered.

For cattle bone breadths (Fig. 27.5), the overall pattern is similar to that for lengths, although there is no clear overall decrease in size (reflecting animal weight) through the course of the aceramic (Period IA). With Period IB, however, there are significantly smaller, indeed very small, animals represented, with large (heavy) indivduals almost absent from the record by Period IIA when the median reaches its lowest point. The rebound of the median by period III is less marked than that for bone lengths (Figure 27.4), which is a phenomenon consistent with an interpretation of the creation of bullocks. Males castrated when young have bones longer than females but somewhat more slender than bulls. Again, this hypothesis requires testing through examination of other data.

In sum, by Period IB (no later than the end of the 6th millennium B.C.), size diminution in cattle had advanced to a point where there were animals that were as short and light as any in later periods. Either small, domestic animals had been imported from elsewhere or the capture, keeping, and eventual breeding of local young wild stock had led to individuals maturing at a much smaller size than their relatives in the wild state. The absence of remains from extremely large individuals after Period IB confirms the pattern seen in Figure 27.3 of a decreasing representation of wild fauna with the ceramic neolithic.

For sheep (Figure 27.6), the course of size diminution differs somewhat from that of cattle. Sheep bones almost as small as any from the later periods occur by late Period IA, although bones from very large (heavy) individuals occur through Period II. The median bone size decreases steadily from IA through IIB, making a marked drop in Period III at the same time that there are almost no large animals represented. Overall, the Period I and II sheep bones from Mehrgarh are larger than contemporary material from sites in the western part of the Middle East (compare with Uerpmann 1979: Diagram 2 which uses the same standard animal). There are a number of possible explanations for this phenomenon, e.g., different wild ancestors, continued capture of young wild animals, and continued hunting, none of which can be evaluated in a satisfactory fashion given the presently available data. One feature which should be noted, however, is that very small sheep at Mehrgarh first occur at the same time (in late Period IA) that sheep remains come to substantially outnumber those from goats (compare Figures 27.3 and 27.6). Inversely, the marked drop in the median for sheep in Period III and the absence of bones from large animals coincides with the shift to goats being markedly better represented than sheep The first shift may represent the beginnings of sheep husbandry in late Period IA, with the second reflecting a change in kill-off pattern coincident with different husbandry goals. Analysis of demographic data, collected but not yet compiled, is required to test these hypotheses.

For the last of the prodomestic bovids, goats (Figure 27.7), the pattern of size diminution is again different. The Period IA bone dimensions are distributed evenly about the zero-line. In the absence of other data, this fact could be used to argue for a completely wild population being represented, given the fact that the standard (represented by the 0.000 line) is the average of dimensions of a male and female. Yet, in Period IA, size variability is very high (higher than for either cattle or sheep), there are bones as small as any from later periods, and in Period IA (3S.3) there are two burials (Tombs 287 and 288) each with five complete skeletons of goats killed when less than three months of age (Lechevallier, Meadow, and Quivron 1982). These features, together with the relative abundance of goats in the earliest levels (Figure 27.3) all suggest the presence of domestic goats from the beginnings of settlement at the site. The presence of bones from very large animals during Period IA, however, does suggest that wild goats were also hunted, at least until late in that period. Their scarcity thereafter may reflect the relatively more remote habitat of those animals than that of wild sheep.

For both cattle and sheep, the trend of size diminution, coincident with increasing representation in the faunal record, can be used as an argument for the local domestication of these animals. For cattle, perhaps, this claim is not so difficult to accept because the form involved was almost certainly related to what is today called *Bos indicus*. Evidence for this species of cattle being represented at Mehrgarh is scanty but convincing. All zygomatic bones recovered from Periods I and II have the flat orbital rim which Grigson (1980: 23) considers a "fairly good indicator for *indicus* skulls," especially in mature animals. In addition, a single skull with intact occipital region, one notched thoracic vertebra, and a clay figurine with pronounced hump, all from late Period I, can be securely identified as *Bos indicus* (Meadow 1984). For sheep, however, the situation is less certain. Cytogenetic studies seem to indicate that domestic sheep descend from the asiatic mouflon and not from the urial which is today found in much of the Pakistan area (Nadler *et al.* 1973). If we accept such findings without qualification, then the apparent size diminution in sheep remains from Mehrgarh must be explained in some way other than local domestication. But even given the validity of the genetic studies, it seems quite possible that, just as a form of cattle different in certain ways from European breeds is likely to have been domesticated in the region, local wild sheep too may have been kept and bred, only to be replaced later in the history of the region by western forms developed for their wool and fat production. A solution to this problem probably depends upon recovery of a series of sheep horncores from Mehrgarh or a site like it on the eastern margin of the Middle East (Meadow 1990).

Much of the previous discussion has revolved around demonstrating and interpreting trends of size diminution in cattle, sheep, and goats. As was noted earlier, however, decreasing size in mammals can be due to factors other than domestication. Thus, it is important to test for the same phenomenon on non-"prodomestic" taxa. For Mehrgarh, such a test was carried out using gazelles, the only wild bovid taxon represented by large numbers of faunal specimens (Meadow 1984a). The species present is probably *Gazella bennetti* (previously termed *G. gazella* or *G. dorcas*. see Groves 1969, Lange 1972, Corbet 1978, and, definitively, Furley, Tichy, and Uerpmann 1988), although the remote possibility exists that a second species—*Gazella subgutturosa*—could also be represented at the site. Furthermore, it is possible that occasional bones from blackbuck *(Antilope cervicapra)* were mistakenly identifed as gazelle because post-cranial elements of the two taxa are sometimes difficult to distinguish. Neither possibility seems too likely, however, given the low variability revealed for all assemblages when the dimensions of the bones identified as gazelle were plotted in relation to a standard taken from the average dimensions of two southeast Iranian gazelles: a male *Gazella bennetti* near Zahedan (NMNH 329354) and a somewhat smaller female of the same taxon from near Chah Bahar (NMNH 328578; see Meadow 1984a for details). In addition to low variability, itself a good indication of the absence of domestic stock, there was no evidence for size diminution in the gazelle remains through the course of settlement at Mehrgarh. This finding lends support to the interpretation of size diminution in cattle, sheep, and goat being related to domestication.

DISCUSSION AND CONCLUSION

Much of this presentation has been concerned with the site of Mehrgarh and the evidence there for early animal domestication. Such an approach is warranted by two considerations. First, Mehrgarh is the only site in the Middle East beyond the Zagros and Elburz which has provided a well documented sequence of paleobiological remains from the early part of the Holocene (before 5000 B.C.) Second, even a late 7th millennium B.C. date for the earliest levels of the site makes the keeping and herding of zebu *(Bos indicus)* as early on the eastern margin as they were for non-humped cattle *(Bos taurus)* in the west. Based on current interpretation of the Mehrgarh material, the following features stand out: (1) goats were kept from the time of the earliest occupation of the site; (2) cattle and sheep are likely to have been domesticated from local wild stock during the course of the aceramic neolithic; (3) size diminution in goats was largely complete by Period IB (5300 B.C. at the latest), in cattle by Period IIA, and in sheep perhaps not until Period III: (4) the contribution of domestic or "prodomestic" stock to the faunal assemblages came to surpass that of other animals early in the aceramic but not in the earliest levels; and (5) the development of animal keeping by the ancient inhabitants of Mehrgarh took place in the context of cereal crop cultivation, the building of substantial mudbrick structures, and the existence of social differentiation and long distance exchange networks as attested by the presence of marine shells, lapis lazuli, and turquoise in some of even the earliest graves (Barthelemy de Saizieu 1988, in press).

An understanding of the impetus for animal domestication in any given area can come only with consideration of the specific socio-economic and environmental contexts in which it occurred. At Mehrgarh, we are dealing with a differentiated if not stratified society, members of which cultivated cereal crops in a lowland alluvial plain blessed by perennial water. The botanical evidence suggests that Mehrgarh was settled only after cereals had been cultivated elsewhere for some time, perhaps at somewhat higher elevations to the west. The highlands are also indicated by the fact that goats were the first "prodomestic" animals exploited in any quantity by the earliest inhabitants of the site. Movement of early agriculturalists into alluvial areas like the north Kachi plain meant that cultivation could be carried out on a large scale, at first perhaps making use only of areas watered by seepage and flooding, later expanding into adjacent zones where simple irrigation could be practiced. Increased cultivation, however, meant increased storage facility requirements for both consumable and seed grains. While storage needs even on a large scale do not require the permanent settlement of a whole population, they do necessitate the maintenance of a facility or facilities for seed grain and, in the absence of pack animals, for consumable grains as well (Testart 1982).

At Mehrgarh, some of the aceramic and most the ceramic neolithic through mid-4th millennium B.C. architectural remains can be interpreted as having been storage facilities. These structures are rectangular units made up of four or more small chambers without any evident doorways. In Period IIA, and even more so in Period III, these buildings become quite elaborate, with central corridors flanked on both sides by rows of long narrow chambers (Jarrige 1981, 1984). Domestic and craft activities, where identifiable, seem to have taken place outside of these structures, the fill inside them generally being secondary deposits of trash. When primary deposits do occur inside the buildings, they are confined to the central corridors. One interpretation of these structures is that they served as storage units for grain, and even though there is only very limited evidence to support such an interpretation, it seems the most likely one. At Mehrgarh, therefore, we may have a central storage facility around which the population would have concentrated during the winter-growing season, a more dispersed pattern perhaps being characteristic of the hot summer months.

The establishment of a permanent home base for sizable human population can be expected to have a marked effect on the environment around the settlement especially if clearing land for cultivation and wood cutting for fuel are involved. Such activities lead especially to a decrease in browse as well as to an increase in the area covered by disturbed habitats, processes which are accentuated when herded animals begin to be kept around a settlement (Nyerges 1977). Furthermore, for a society which depends for its animal protein chiefly on "big game", gradual elimination of hunted animals from the "catchment area" of the site is likely to occur, such activity being positively reinforced because of the value of agriculture of killing-off crop-robbing ungulates. Under such conditions, maintenance of accustomed levels of animal protein in the diet requires that hunters forage further afield or that animals be kept by the population.

The indispensable precondition for the domestication of food animals in the Middle East appears to have been cereal crop agriculture, creating as it did the environmental, social, and conceptual preconditions favorable to the development or adoption of stock keeping. As noted early in this essay, cereal crop cultivation and stock keeping both reflect a concern for property and for its maintenance through time. These concerns involve a shift in focus from the immediate to a more distant future, this shift taking the form of storing seed grain and preserving fertile females. Initially, perhaps, animal keeping was not a society-wide phenomenon, instead being carried out by a few specialists in the context of a largely hunting and cultivation-oriented population. (The two graves at Mehrgarh with caprine deposits can be interpreted in this fashion.) The mere keeping of a small or slowly growing herd in the area of a settlement, however, would tend to increase pressure on the grazing and browsing environment within the catchment area, thus helping to eliminate the habitats of wild animals and reinforcing a move toward the general adoption of animal husbandry. This series of interconnected factors is only one of many feedback loops which can be conceptualized to help explain how the keeping of food animals became integral to the lives of ancient Middle Eastern populations.

An equally interesting topic is to speculate upon why different species received the attention of different populations. For the eastern margin of the Middle East, focus was on cattle. By the end of Period IB at Mehrgarh, cattle bones make up more than 50 percent of the faunal assemblage (Figure 27.3). While the proportion is somewhat lower in fourth and third millennium assemblages (Meadow 1989), it is still greater than what is commonly found at sites in the Middle East. At two other 4th and 3rd millennium B.C. sites in the greater Indus valley region (Jalilpur in Punjab and Balakot near

Las Bela), cattle comprise up to 75 percent of the assemblages (Meadow 1979, 1988). High proportions of cattle remains in a site are the more remarkable when one considers that a cow kept under primitive conditions will not bear her first young until the age of 3 or 4 years, a generation span about twice that of sheep and goats. As a result, a larger number of individual caprines than of cattle can be killed off while still maintaining a given herd size. Thus, for any archaeological assemblage, caprines are likely to be over-represented and cattle under-represented in relation to what their proportions were in the living community. Another consideration is that individual cattle are so large that, unless the meat could be preserved in some fashion, carcass distribution beyond the confines of the immediate family unit would have been necessary, thus serving to reinforce a wider range of social ties than would have been the case for the caprines.

The popularity and success of cattle keeping which is reflected in archaeological assemblages from the eastern margin of the Middle East and from South Asia is probably due to the fact that *Bos indicus* is well adapted to life in hot, semi-arid environments (see Marshall 1989 for a review of the literature especially for Africa.) Given this fact, it is rather surprising that *zebu* remains have not been more widely identified through lower elevations across the Iranian plateau, along the Gulf, and into Mesopotamia. The reason for this is probably the commonly held view that cattle were first domesticated in Eastern Europe and Anatolia, a view which is, of course, an artifact of the history of archaeological exploration and excavation. With the presence of fully domestic cattle at Mehrgarh by at least the mid-6th millennium B.C., however, the eastern margin of the Middle East must be seriously considered as a possible "hearth" for the domestication of a form of cattle different from that domesticated in the northwest, a form which would have been better adapted than taurine cattle to life in hotter and drier regions. Once attempts are made to identify zebu remains in the archaeological record, it will be most instructive to determine the distribution of this form at different times in the prehistory and history of the Middle East.

In conclusion, I return to the quotation from V. Gordon Childe which leads off this essay. When revising his great work in the early 1950s, Childe was only beginning to get some idea of how far his "neolithic revolution" would be pushed back into the past. At that time, the remains of village farmers in Baluchistan seemed to indicate a stage of development similar to and therefore contemporary with what was then thought to be among the earliest evidence for villages in the Near East. Now, after an intervening period of 40 years during which time the much greater antiquity of events in the area of the Fertile Crescent has become firmly established, we have come almost full circle. With the excavations at Mehrgarh, we can again find grounds to argue that "there were neolithic farmers in Baluchistan before unambiguous influence from the west is archaeologically detectable," although what constitutes "detectable influence" promises to remains a subject of some debate.

NOTES

[1] This is a revised version of a paper titled "Animal Domestication in the Middle East: a View from the Eastern Margin," completed in 1983 and published in 1984 (Meadow 1984a). References have been updated to 1990 and the figures are all recast to reflect current interpretation of the stratigraphy of Mehrgarh following the completion of excavations in area MR3/4 in 1985. Some portions of the text are unchanged from the original, others are completely new, and still others have been eliminated. The principal purposes of this rewrite are to present current understandings of the Mehrgarh data and to make the information available to as wide an audience as possible in South Asia.

[2] All dates are in calendar years B.C. unless otherwise noted. "bp" radiocarbon determinations have been calibrated to B.C. dated using the University of Washington, Quaternary Isotope Laboratory, Radiocarbon Calibration Program 1987, Revision 2.0 (*Radiocarbon 28* (1986)).

[3] I wish to acknowledge the support and assistance rendered by the French Archaeological Mission in Pakistan and by the Department of Archaeology and Museums, Government of Pakistan for my work at Mehrgarh. Particular thanks are due Jean-Francois and Catherine Jarrige, Blanche Barthelemy de Saizieu, Lorenzo Costantini, Monique Lechevallier, Gonzague Quivron, Anaick Samzun, and Pascal Sellier of the French Mission and M. Istiaq Khan, former Director, and Dr. Ahmed Nabi Khan, current Director of Archaeology and Museums of Pakistan. I have profited greatly from discussions with Jean-Francois Jarrige on the chronology and interpretation of Mehrgarh materials and from Lorenzo Costantini on palaeoethnobotany. A good deal of what is written here reflects their ideas freely expressed. During the 1981 and 1982 field seasons, Nerissa Russell assisted in the analysis of the faunal remains. Her diligent and dedicated work permitted a much greater number of specimens to be examined than otherwise would have been possible. Valuable comments on the Mehrgarh material have come from Juliet Clutton-Brock, Caroline Grigson, Sebastian Payne, Richard Redding, Hans-Peter Uerpmann, and Melinda Zeder to name only a few of the many colleagues who have helped me greatly over the years. Useful criticisms of the manuscript were made by C.C. Lamberg-Karlovsky and Rita Wright, while incisive observations by Marielle Santoni helped mold the approach taken herein.

[4] The nomenclature used here follows that in Zohary and Hopf (1988) is different than that used by most investigators before that date.

[5] To prepare Figure 27.3, the following elements, identified at least to skeletal part were tabulated: articular ends of long bones, articular areas of scapula and pelvis, carpal and tarsal bones, phalanges, maxillary and mandible pieces with teeth, single deciduous third molars, and permanent third molars. The counts, noted at right of each bar, are not corrected for articulating specimens. The proportions of goat (*Capra*) and sheep (*Ovis*) reflect the ratio of goat to sheep among those elements which could be identified to the genus level (see Table 27.2 for specimen counts). Because of difficuties in distinguishing fragmented remains of water buffalo from cattle and blackbuck from gazelle, those pairs of taxa are tabulated together. It is clear from those skeletal parts that can be distinguished, however, that cattle (*Bos*) and gazelle (*Gazella*) remains greatly outnumber those of buffalo (*Bubalus*) and blackbuck (*Antilope*), respectively.

[6] Because of the small size of the collection, the remains from the section cutting in MR3D could not be broken down in as detailed a fashion as for 3T and 3S. Thus 1A.3D.1-5 and 6-10 represent the first half and second half of the Period 1A respectively. Even with this limitation, the trends shown in 3D of decreasing representation of wild fauna and increasing proportion of sheep relative to goats parallels than in 3T and 3S.

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PART IV

HARAPPAN ARCHAEOLOGY AND THE GULF

DANIEL T. POTTS

28. Tell Abraq and the Harappan Tradition in Southeastern Arabia

"According to all descriptions, including the earlier ones, Oman must be a veritable paradise; and if ever there existed closer relations between ancient Arabia and India, the principal rendezvous must have been in this region, which as yet is far from being fully explored" (Hommel 1903: 719).

INTRODUCTION

NOWADAYS one does not normally delve into the works of Fritz Hommel for inspiration on the subject of Harappan-Arabian contacts during the late third and early second millennia B.C. Nevertheless, long before any archaeological evidence had been found to confirm his views, the great German Orientalist had recognized the inherent potential of the Oman peninsula for shedding light on early ties between Arabia and the Indian subcontinent. Thanks to the study published in this volume by C. Edens, I am relieved of the task of bringing the reader up to date on Harappan or Indus Valley-related archaeological finds made in the Arabian Gulf during the past three decades. Therefore, I shall concentrate solely on recent discoveries at Tell Abraq which are relevant to the subject of this volume.

TELL ABRAQ

Tell Abraq is located in the United Arab Emirates on the border of Sharjah and Umm al-Qaiwain (Fig. 28.1). Although sounded briefly in 1973 by an Iraqi expedition (Salman 1974:m), the mound, which covers roughly 1.76 hectares and rises to a maximum height of 10 meters above sea level, had never been the object of any extensive research until 1989 when a team from the Carsten Niebuhr Institute of the University of Copenhagen opened a 5 × 40 m step trench during five weeks of excavation (11 January-15 February). Despite the fact that Tell Abraq is today situated several kilometers from the coast of Umm al-Qaiwain, the site is less than 100 meters south of an ancient shoreline of middle Holocene date (5th-4th millennia B.C.), and only about 200-300 meters south of the presumed location of the coast during the third millennium B.C. (R. Dalongeville, pers. comm.). Thus, Tell Abraq is without any question a coastal settlement.

The appeal of Tell Abraq lies principally in the fact that it is a habitation site with at least 5 meters of stratified deposit. Although archaeological research on the Oman peninsula has been expanding steadily since the soundings at Sohar in 1958 (Cleveland 1959:11), there can be little doubt that an imbalance has arisen in the amount of attention devoted to burials versus settlements, and this has hampered attempts to reconstruct the culture history of the region. The information to be gained from burials is, to be sure, far from insignificant, but as tombs in southeastern Arabia were frequently reused and therefore mixed, and commonly robbed as well, the finds which they contain often cannot be dated and understood except with reference to habitation sites. On the other hand, most of the excavated settlements in the Oman peninsula are single-period sites, and this is generally true whether

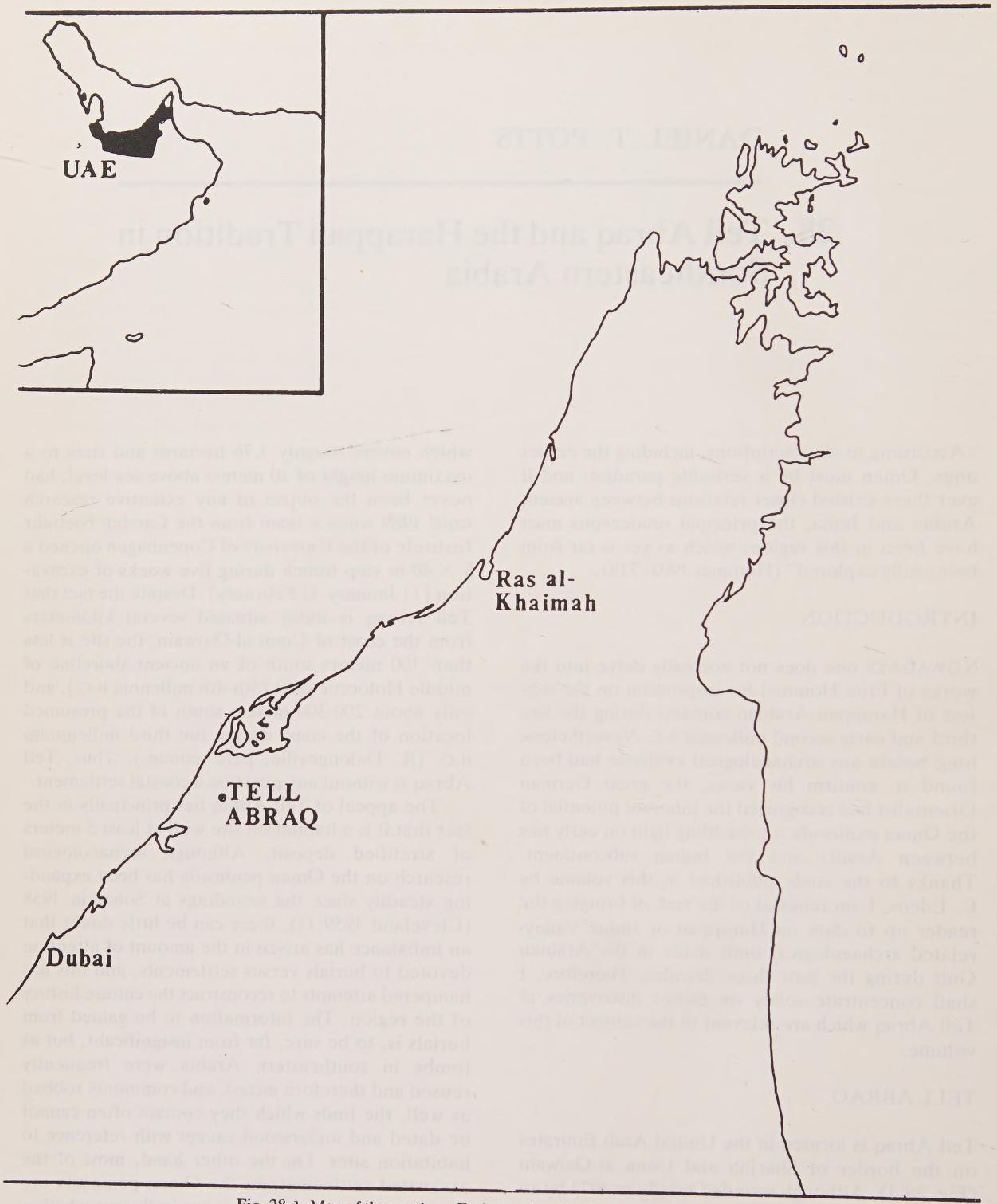
UAE
Ras al-
Khaimah
TELL
ABRAQ
Dubai

Fig. 28.1. Map of the northern Emirates showing the location of Tell Abraq.

we are speaking of such Iron Age sites as Rumeilah, Hili 2, or al-Thuqaibah; the mid-second millennium type-site of Shimal; or the third millennium sites of Hili 8, Amlah, and Maysar 1. The fact is that the Oman peninsula has, until now, lacked a deep, stratified mound like that at Ras al-Qalat, on Bahrain, in which the prehistoric sequence of the area could be followed in its entirety and which could serve as an anchor for the chronology of the area. This situation, combined with an overemphasis on the excavation of burials, has meant that, while assemblages have been obtained from different sites for each of the various prehistoric periods in the region, the links between them, and indeed the evolution of the area as a whole, has remained obscure. We have a fairly good, punctual record of occupation, but little understanding of social and economic development in the Oman peninsula through time. Even at the most basic level of ceramics, many outstanding difficulties remain in correlating assemblages from different parts of the peninsula and in firming up the local chronology. To my knowledge, the only other stratified mound in the U.A.E. which offers a suitably long record of occupation is Nud Ziba near Khatt, on the border of Ras al-Khaimah and Fujairah. Excavations, however, have never been conducted there.

It was, therefore, with considerable excitement that we witnessed, during our first season of excavations at Tell Abraq, the unfolding of a sequence extending from the early third to the middle of the 1st millennium B.C. Here, for the first time, was an apparently continuous sequence of deposits in which were represented all of the principal prehistoric periods of the region, with the exception of the middle Holocene, pre-ceramic era of stone-tool use. At Tell Abraq we are able to observe a transition from the late third millennium, Umm an-Nar period, to the early second millennium, Wadi Suq period. We can now see that the Wadi Suq period may be broken up into at least two, or possibly even three, distinct sub-periods. We have found a rich inventory of early Iron Age material, comparable with finds made at other coastal sites in Sharjah and Ras al-Khaimah, and we have a later phase of Iron Age occupation, in which finds resembling those from period II at the type-site of Rumeilah, in Al Ain, were made. Much is therefore new, although much can be related to previously excavated sites in southeastern Arabia. As both a short announcement (Potts, in press b) and a longer report (Potts, in press c) on Tell Abraq are currently in press, and as the subject of this volume is Harappan civilization, I shall concentrate here on the evidence of links between Tell Abraq and the Harappan tradition.

The Late Third Millennium B.C. at Tell Abraq

A third millennium visitor to Tell Abraq (Fig. 28.2) would have been confronted by two imposing buildings. In Square OI, on the western side of the site, excavations have revealed the edge of a circular, Umm an-Nar tomb. Structures of this sort, faced with cut limestone ashlars, are well-known in many other parts of the Oman peninsula, from the Sharqiyah in the east to Ru'us al-Jibal in the north (Potts, in press a, for full references). In Square I, roughly 10 meters east of the tomb, was an Umm an-Nar roundbuilding, typical in plan but unusual in that it was built of mudbrick with a facing of stone. Excavations have shown that there were in fact two Umm an-Nar buildings at Tell Abraq, the later one built directly over the earlier one, with about 90 centimeters of deposit separating them.

Less imposing perhaps from an architectural point of view, but no less important with respect to the finds which they yielded, were two areas to the east of the round building. Excavations in Square II revealed a pair of sunken, circular, fired-clay ovens backed by a low mud wall (Pl. 28.1), to the north of which was an area of burning and the remains of a white plaster floor. In Square III, on the other hand, a rectangular fireplace (Locus 27) with walls of fired clay standing 20 centimeters, was excavated (Pl. 28.2). Because of the fact that the foundations of a stone retaining wall, supporting the edge of a mudbrick platform of Iron Age date, had been built almost directly over the third millennium fireplace, only a portion measuring 1.5 × 1.3-1.5 meters could be exposed. This however, was full of sherds, charcoal, and hundreds of burnt date stones. Although many carbon samples were taken from the various contexts just described, no carbon 14 dates are yet available. Nevertheless, the remains under discussion can all be dated to the middle or end of the Umm an-Nar period (c. 2300-2000 B.C.) on the basis of the associated pottery, much of which can be paralleled in the sequence from Hili 8 (Cleuziou, in press; see for full refs., Potts, in press c).

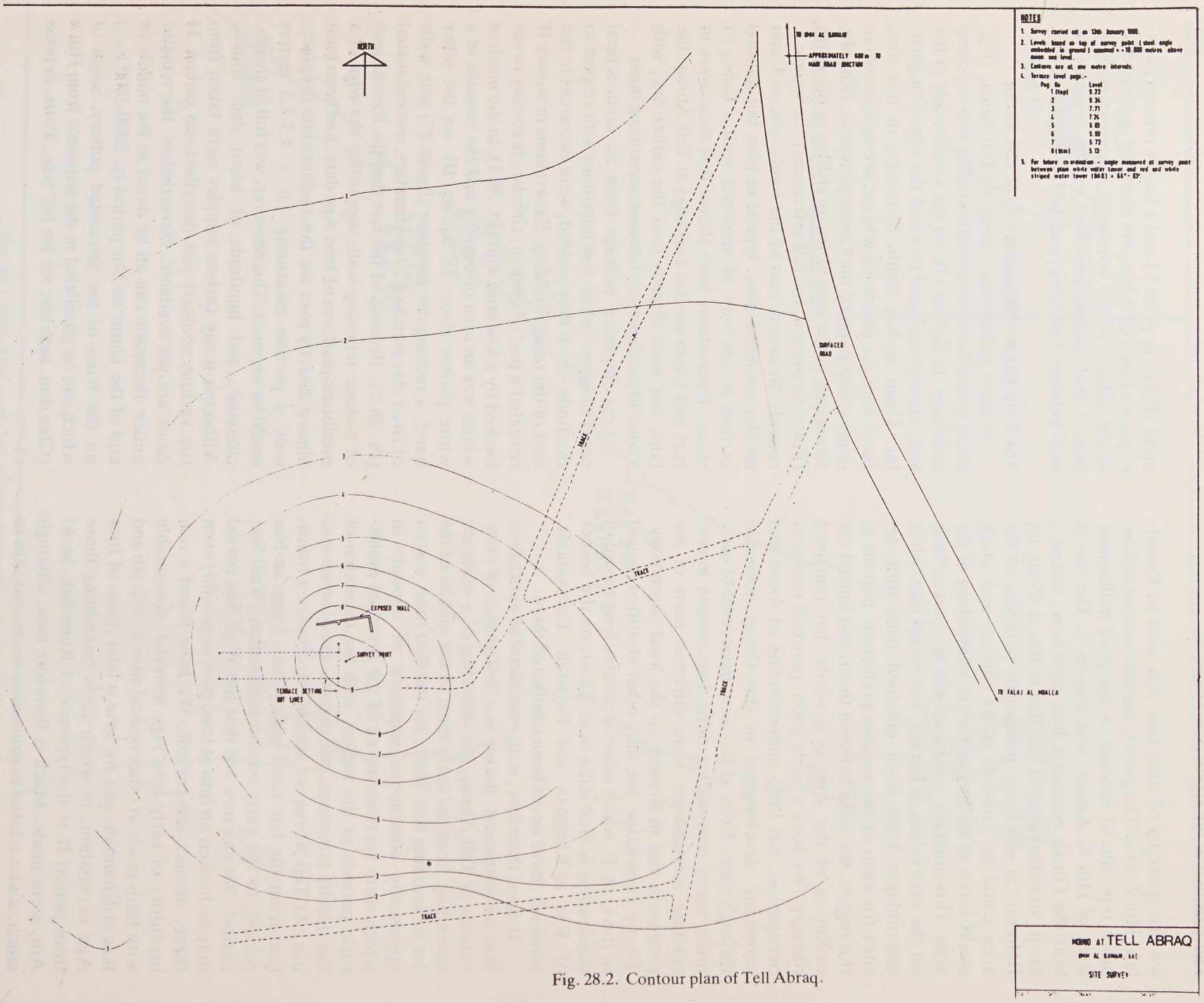
NOTES
1. Survey carried out on 13th January 1989.
2. Levels based on top of survey point (steel angle embedded in ground) assumed = +10.000 metres above mean sea level.
3. Contours are at one metre intervals.
4. Terrace level pegs:-
Peg No / Level
1 (top) 9.22
2 8.34
3 7.71
4 7.24
5 6.69
6 5.98
7 5.73
8 (btm) 5.13
5. For future co-ordination - angle measured at survey point between plain white water tower and red and white striped water tower (BAB) = 66°-03'.
NORTH
TO UMM AL QAIWAIN
APPROXIMATELY 600 m TO MAIN ROAD JUNCTION
SURFACED ROAD
TRACK
TRACK
TRACK
TRACK
TO FALAJ AL MOALLA
EXPOSED WALL
SURVEY POINT
TERRACE SETTING OUT LINES
1
2
3
4
5
6
7
8
9
MOUND AT TELL ABRAQ
UMM AL QAIWAIN, UAE
SITE SURVEY

Fig. 28.2. Contour plan of Tell Abraq.

There is little doubt that the two most distinctive finds in the Harappan tradition discovered during the first season at Tell Abraq are a pair of cubical stone weights (Fig. 28.3, Pl. 28.3) found in association with a wealth of Umm an-Nar painted pottery in the late Umm an-Nar fireplace (Locus 27). Specifically, fragments from several storage jars with large spirals and hatched bands painted in black (Fig. 28.4) can be paralleled at Hili 8 in period IIe and possibly IId. C14 dates of 3840± 100b.p. (CRD 2470-2200, 2161-1241) and 3900± 100b.p. (CRD 2490-2290, 2269-2204) have led Cleuziou to equate IIe generally with the Old Akkadian period in Mesopotamia (Cleuziou, in press).

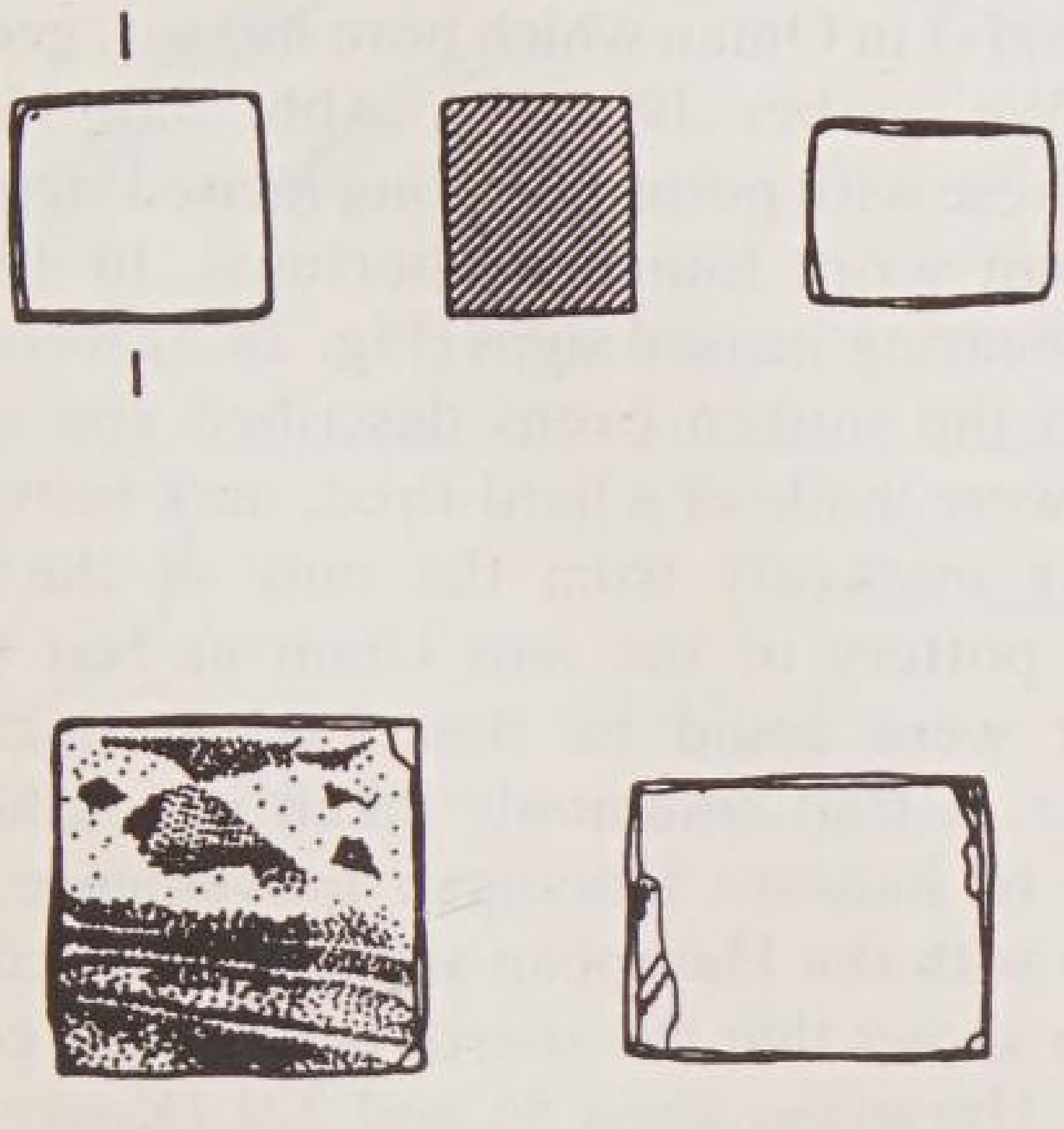

Fig. 28.3. Harappan cubical stone weights from Locus 27.

The smaller weight from Tell Abraq (TA 125) measures 2.1 × 1.9 × 1.6 centimeters and weighs 15 grams (on a digital scale with a variance of ± 1 gram up to 60 grams). It is probably made of jasper (R. Dalongeville, pers. comm.) a stone never used for the manufacture of weights at Harappa; found only once among the 244 weights discovered during the early excavations by E.J.H. Mackay at Mohenjodaro; and attested twice at Chanhudaro (Hendrickx-Baudot 1972:6). The larger weight (TA 146) is made of highly polished, white and tan banded chert. It measures 3 × 3 × 2.5 centimeters and weighs 53 grams. Weights of banded chert are known from many of the major excavated Harappan sites, including Mohenjodaro (Marshall 1931: Pl. CXXXI:20-35; Mackay 1937:Pl, CV:1, 3, 5), Chanhudaro (Mackay 1943:Pl. XCI:29-32), Harappa (Vats 1940:Pl. CXVIII:1, 5-8, 14-19, 22-25), and Lothal (Rao 1986:379, fig. 142), not to mention three other sites well outside the Harappan area: Susa (Amiet 1986:280, no. 93), Qalat al-Bahrain (Bibby 1969:Pl. XIX), and Shimal (de Cardi 1986: 23, 1988: Fig. 14:22). The banding of the Abraq weight, and others of the type is quite distinctive of

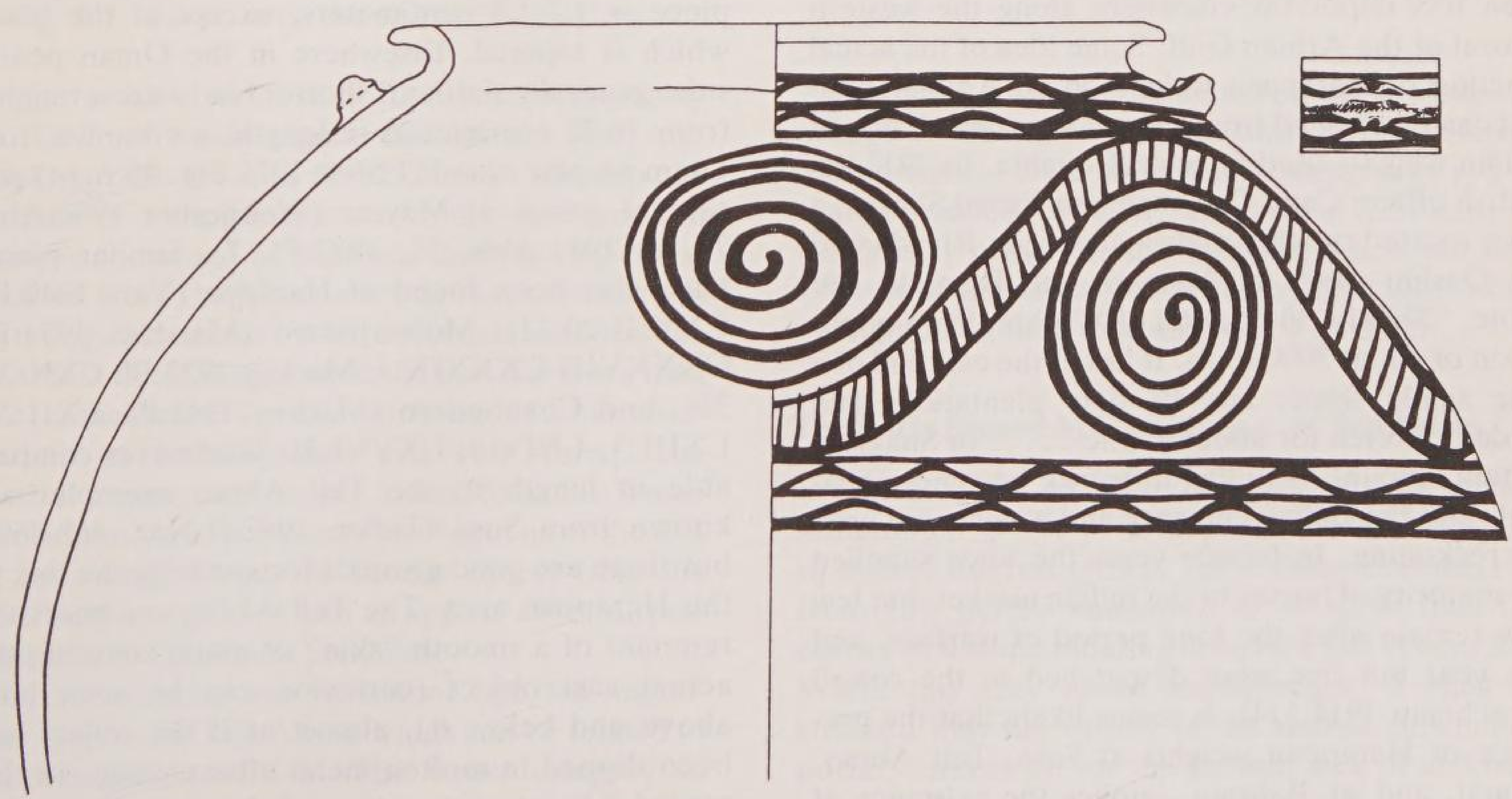

Fig. 28.4. Black-on-orange Umm an-Nar painted jar (TA 824) from Locus 27, rim dia. 24 centimeters.

the stone found at Rohri, 70 kilometers northeast of Mohenjodaro (Possehl, personal communication).

The absolute weights of the finds from Tell Abraq, 15 and 53 grams, conform perfectly with what is known of the Harappan metrological system. The smaller of the two almost certainly represents the basic unit of the Harappan system, the median value of which has been calculated at 13.63 grams. (Zaccagnini 1986:20 and Potts, in press a, with literature). At least one of the weights from Mohenjodaro weighs 14.001 grams (Hendrickx-Baudot 1972:21). The larger cube from Tell Abraq undoubtedly represents a weight four times that of the basic unit just described, and as such can be compared with an example from Harappa weighing 53:1 grams (Hendrickx-Baudot 1972:24).

It is important to stress that the weights found outside the Harappan area are not local products based on the Harappan standard. Rather, from Susa in the north to Shimal and Tell Abraq in the south, all of the Harappan weights found in the Gulf region can without hesitation be considered actual imports from the area of India and Pakistan. Written records dating as far back as the Portuguese period amply attest to the important role played in Muscat and Bahrain by Bhattia merchants from Sind and Kutch who ran many trading establishments (Allen 1981:40-53). Nor have Indians been less important elsewhere along the western littoral of the Arbian Gulf. Some idea of the actual function of Harappan weights in an Arabian context can be gleaned from a much later description of Indian weights used in central Arabia. In 1912 the British officer Capt. G. Leachman visited Shakra, a town located roughly midway between Riyadh and the Qasimi oases of Anayzeh and Burayda. He wrote, "Shakra, the capital of Woshm, has a population of about 5000 souls. It lies at the east end of a long sandy slope, and its date plantations and gardens stretch for about a mile ..... In Shakra a certain amount of Indian influence becomes apparent, and the Indian currency and weights are used for reckoning. In former years the town supplied the majority of horses to the Indian market, but few now remain after the long period of warfare, and this year but five were despatched to the coast" (Leachman 1914:514). It seems likely that the presence of Harappan weights at Susa, Tell Abraq, Shimal, and at Bahrain, implies the existence of commercial ties between those areas and the Indus Valley. Nor are weights the only finds which suggest the existence of links to the east.

In 1981 G. Weisgerber published a small group of rim sherds from the late 3rd millennium B.C. site of Maysar-1 in Oman which bore incised, geometric signs (Weisgerber 1981:218, Abb. 52). He compared these with pottery bearing incised signs in the Harappan script found at Shortugai. In 1989 two sherds bearing incised signs (Fig. 28.5) were found close to the sunken ovens described above. Both sherds were made of a hard-fired, dark brown ware differing markedly from the bulk of the red or orange pottery of the late Umm an-Nar period. Neither were could be described as micaceous, however, a trait commonly taken in southeastern Arabia to indicate Harappan provenience. Comparison with the Harappan signlist compiled by A. Parpola shows that the sherds bear marks comparable to Harappan signs 86 and 224 (Koskenniemi and Parpola 1979:19-20).

Another object from the same area that deserves mention is a large copper or bronze blade-axe (TA 18+70, currently undergoing analysis by Prof. V. Buchwald, Danmarks Tekniske Hojskole). The axe (Fig. 28.6, Pl. 28.4), found broken in two pieces, measures 30.1 centimeters in length and weighs 1302.6 grams. The butt of the axe is 4.8 centimeters wide, while the general thickness of the piece is 1.7-1.8 centimeters, except at the blade which is tapered. Elsewhere in the Oman peninsula, generally similar if shorter blade-axes, ranging from 16-22 centimeters in length, are known from Umm an-Nar island (Frifelt 1975:Fig. 46 right) and several graves at Maysar (Weisgerber 1980:Abb. 78.11, 1981:Abb. 34, 1983:Pl. 7). Similar pieces have also been found at Harappa (Vats 1940:Pl. CXXIII:20-21), Mohenjodaro (Marshall 1931:Pl. CXXXVIII-CXXXIX:1; Mackay 1937:Pl. CXX:28, 30), and Chanhudaro (Mackay 1943:Pl. LXII:21, LXIII:3, LXIV:8, LXVVI:3). Blade-axes comparable in length to the Tell Abraq exemplar are known from Susa (Tallon 1987/II:Nos. 468-469), but there are good grounds for stressing the link to the Harappan area. The Tell Abraq axe bears the remnant of a smooth "skin" of metal covering the actual cast object (corrosion can be seen both above and below it), almost as if the object had been dipped in molten metal after casting. In this regard it is interesting to note that one of the axes from Mohenjodaro was described by Mackay as

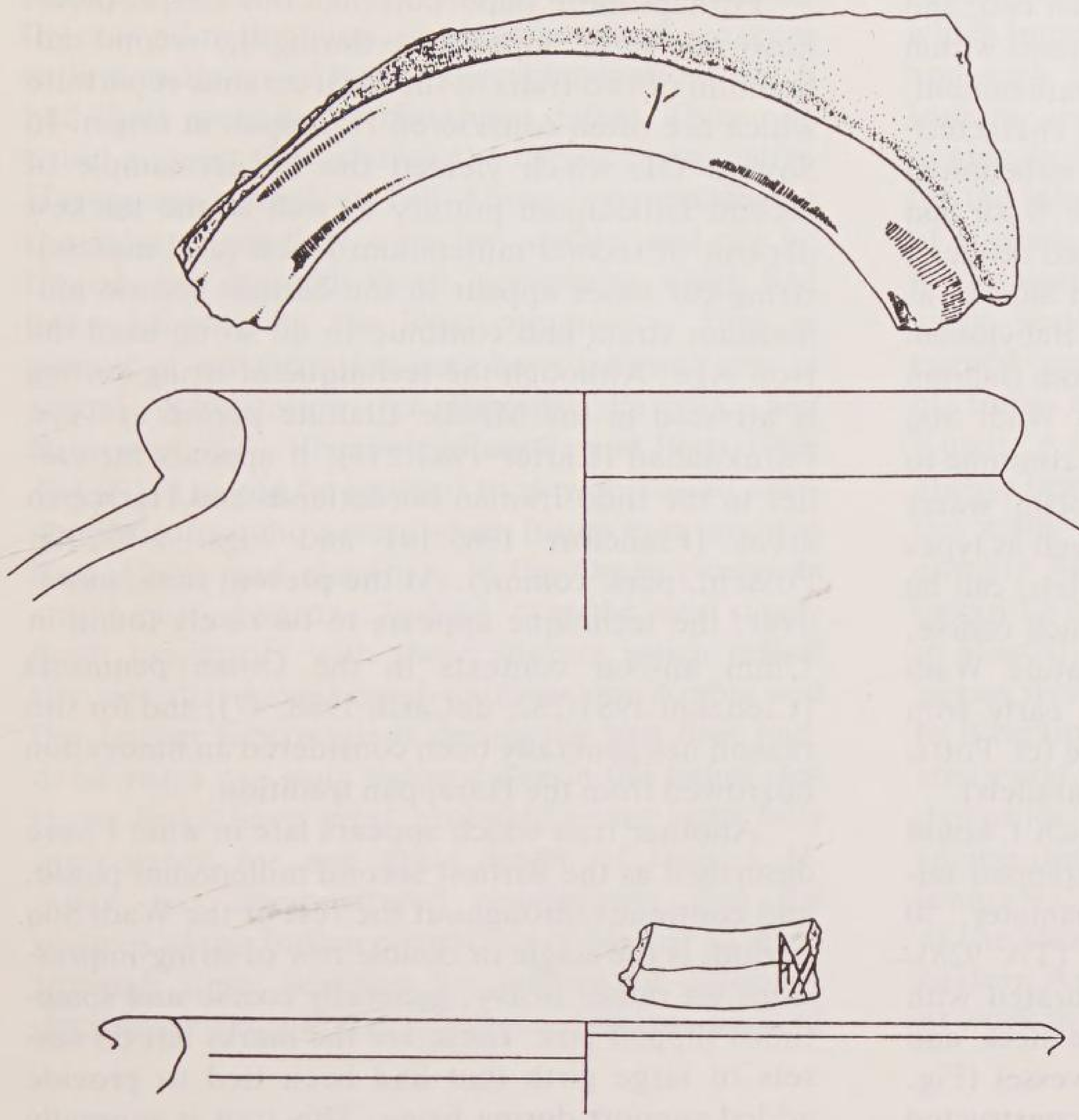

Fig. 28.5. Sherds TA 139 and TA 35 with incised signs.

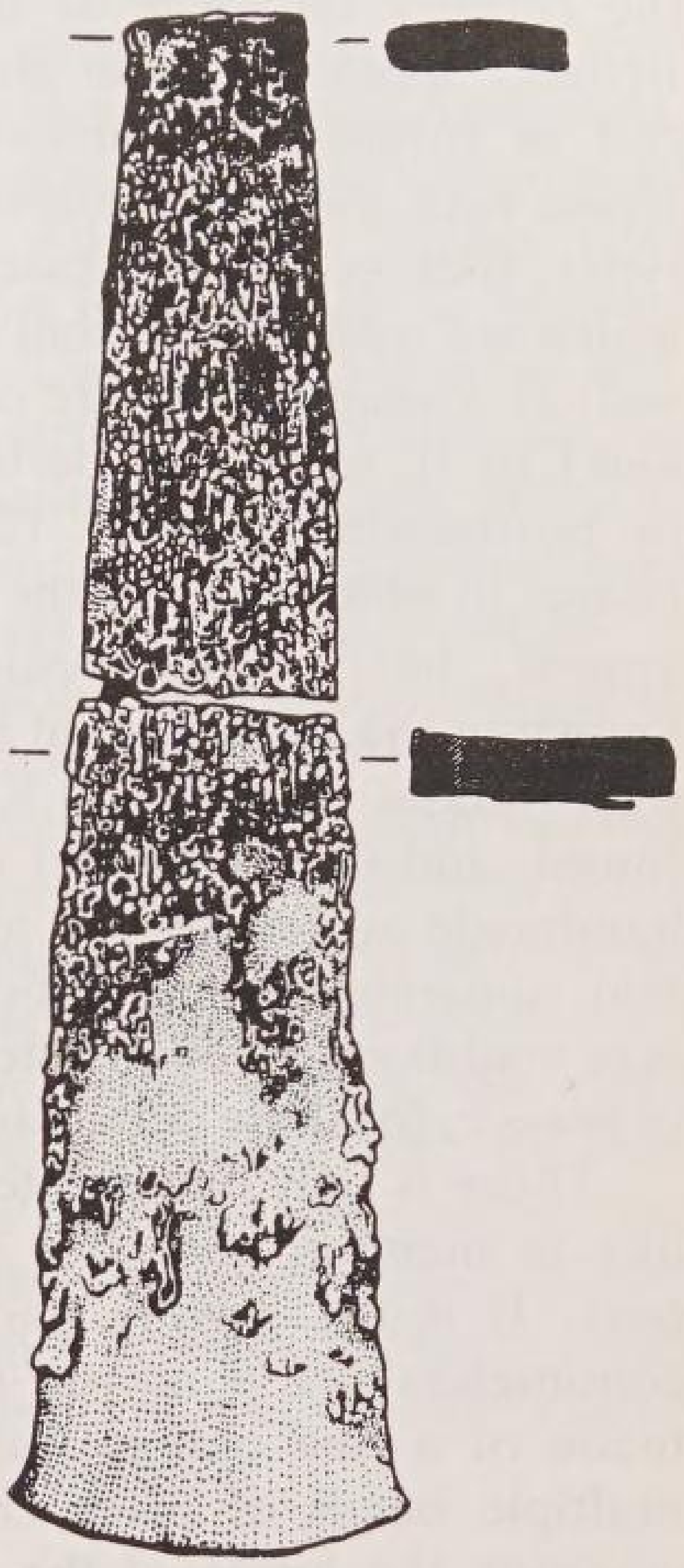

Fig. 28.6. Blade-axe TA 18+70.

having "a thick, even skin" that was "remarkably clean and extremely regular in thickness (0.03 in)" (Mackay 1937:456 and Pl. CXX:30). Whether the presence of a similar feature on the axe from Tell Abraq is construed as evidence that the object was imported from the Indus area, or that a measure of technological transfer had occurred between the two areas, there seems no doubt that it is more than mere coincidence to find such an unusual characteristic at Mohenjodaro and Tell Abraq. The fact that copper was amply available in the Oman peninsula at this date should not blind us to the fact that an exotic copper or bronze object from the Indus Valley may have had an appeal which surpassed that of locally made products.

This concludes our review of late 3rd millennium finds from Tell Abraq which can be related to the Harappan tradition. The entire category of painted ceramics has been omitted in anticipation of further study of the material found in 1989. Although there were no painted motifs in black-on-orange or red ware which obviously recalled Harappan ceramics, there were many examples of red or orange-washed, undecorated wares at least some of which may prove to be Harappan. These are best left out of the discussion at the present time, however, pending their examination by an expert.

The Early Second Millennium B.C. at Tell Abraq

Excavations in 1989 brought to light second millennium pottery in deposits of fill in every square of the test trench, but architectural remains from this period amounted to no more than the corner of a stone building in Square OII (Locus 31). While this may sound unimpressive, it must be stressed that the variety of the second millennium pottery makes up for the present lack of architecture, and it is not incorrect to say that no other excavated site in the Oman peninsula has yielded comparable, stratified evidence of at least two, and possibly three clearly distinguishable phases within the ceramic sequence of the second millennium. Broadly speaking, these phases can be characterized as follows: (1) an early second millennium phase with some of the classic, painted Wadi Suq types, such as spouted vessels and banded beakers, which are well-known from the tombs at Shimal, as well as a small admixture of imported Babylonian and City II, red-ridged Barbar sherds from Bahrain or northeastern Arabia; (2) a mature Wadi Suq phase, in which some of the same types continue to appear, but in which painted and plain wares known in the settlement at Shimal, as well as types with Middle Elamite and Kassite parallels, can be found; and (3) a terminal phase in which coarse, handmade wares appear alongside mature Wadi Suq unpainted types, anticipating the early Iron Age tradition so well-attested on the site (cf. Potts, in press c, for some details and precise parallels).

There is only one painted sherd which I would like to mention here as a possible Harappan import. It is the slightly flaring rim (diameter, 10 centimeters) of a narrow-necked jar (TA 928), made of a fine orange ware and decorated with multiple bands of black encircling the neck and covering the inside of the lip of the vessel (Fig. 28.7). This piece is comparable to a reconstructed jar of the same shape and decoration from tomb 6 at Shimal, and to which B. de Cardi has drawn parallels at Lothal A and Rangpur IIA, dating to the period around 1900 B.C. (de Cardi 1988:46 and Fig. 11). It should be noted, moreover, that the Shimal vessel was found in the same grave as a Harappan weight. The chronology for Gujarat is changing and this date may be earlier.

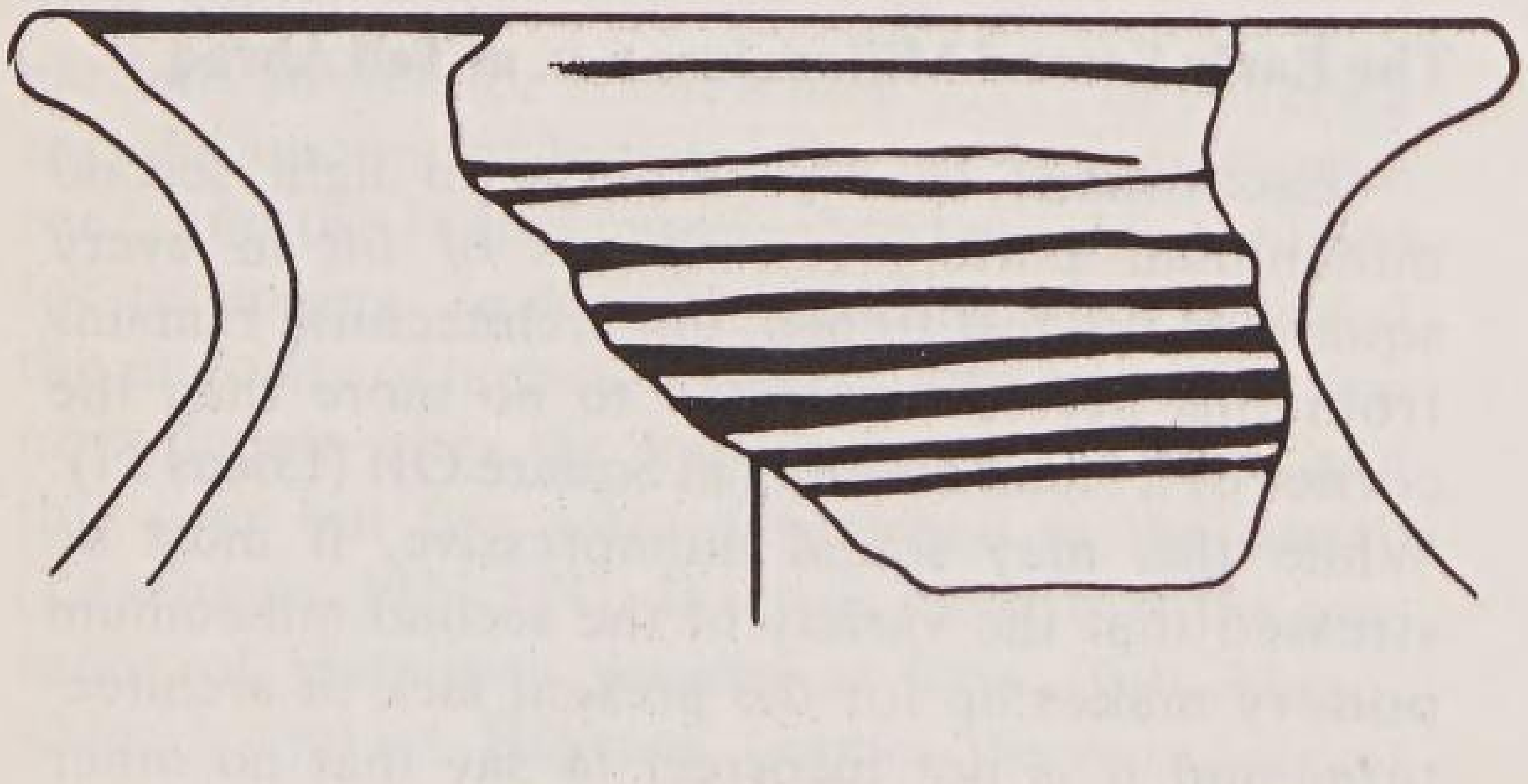

Fig. 28.7. Sherd TA 928.

Perhaps more important than this unique piece, however, is the appearance during the second millennium of two traits in the local ceramic repertoire which are often considered Harappan in origin. In Square OI, which yielded the largest sample of second millennium pottery as well as the thickest deposit of second millennium levels (c. 2 meters), string-cut bases appear in the earliest second millennium strata and continue to do so up until the Iron Age. Although the technique of string-cutting is attested in the Middle Elamite period at Tepe Farukhabad (Carter 1981:211), it appears far earlier in the Indo-Iranian borderlands and Harappan areas (Francfort 1985:101 and Figs. 9-10; G. Possehl, pers. comm.). At the present time, moreover, the technique appears to be rarely found in Umm an-Nar contexts in the Oman peninsula (Cleuziou 1981-282; deCardi 1988: 47), and for this reason has generally been considered an innovation borrowed from the Harappan tradition.

Another trait which appears late in what I have described as the earliest second millennium phase, and continues throughout the rest of the Wadi Suq period, is the single or double row of string-impressions on rather heavy, generally coarse and sometimes slipped jars. These are the marks left on vessels of large girth that had been tied to provide added support during firing. This trait is generally absent in the Oman peninsula during the Umm an-Nar period, although it is attested at Maysar-1, where it has been interpreted as a sign of Harappan influence (Weisgerber 1981:218). In the Indus Valley, on the other hand, it is a feature well-documented (Francfort 1985:101 and Figs. 2-3, 17; G. Possehl, pers. comm.).

It may therefore be suggested that the innovations just described both originated in the Harappan tradition, although the ceramics on which they are found clearly belong to the indigenous, Wadi Suq tradition of southeastern Arabia during the second millennium.

THE HARAPPAN TRADITION AND SOUTHEASTERN ARABIA

It is, in some ways, tempting to separate the Harappan-related artifacts from Tell Abraq both chronologically and functionally into two groups. Although our sample is still small, actual imports from the Indus Valley are better attested in the late third millennium, Umm an-Nar deposits. During the second millennium, on the other hand, we seem to find evidence of technological innovations which had their roots in the Harappan milieu. Thus, one could suggest that, during the earlier phase native Harappans settled at Tell Abraq, whereas during the later phase they were less visible, and can be traced only through those innovations which had been adopted by the local community. Thus, a period of acculturation may have followed one of actual colonization (cf Parpola, Parpola, and Brunswig 1977; Brunswig, Parpola and Potts 1983: 104 ff.). I would be inclined to view this as an over-simplification, however, which future excavation at Tell Abraq and elsewhere in the Oman peninsula could easily disprove. Indeed, even the most superficial familiarity with those sources which reflect the ties that have bound southeastern Arabia and the Indian subcontinent during the past four hundred years can only enforce one in the belief that those links have most probably never been fully interrupted for any great length of time. C.H. Allen has demonstrated convincingly that the sources of the Indian population of Muscat changed through time, whether for reasons of economic decline or exceptional vitality in different parts of India, famine, flood, plague, or earthquake, all of which impelled people to leave their homes in India and seek trade and a better life elsewhere. That Indians should have gone as far as the Oman peninsula is not, Allen suggests, so very surprising. Of the late 18th and early 19th century movement of Kutchis to Muscat, Allen writes, "Kutch, lying to the east of the Indus River mouth, is, in many ways, very similar to 'Umān in that it is an arid, rugged country that is virtually cut off from the rest of India by the sometimes impassable Rann of Kutch. As a result, contacts with neighbours have always been easier by sea, a condition facilitated by the many fine ports along the Kutchi coast, most notably Mandvi" (Allen 1981:42-43). As Kutchis began to compete successfully with Sindi Bhattias in Muscat, moreover, members of this latter group began steadily to abandon Muscat and move north to Bahrain. We have no comparable sources at our command which could throw light on the actual dynamics of Harappan movement into the Gulf region during the late third and early second millennia B.C., but it would surprise me greatly if some of the same factors which brought Indians to southeastern Arabia in recent centuries were not already at work in more remote antiquity.

ABBREVIATIONS

AAE	Arabian Archaeology and Epigraphy
AUAE	Archaeology in the United Arab Emirates
BASOR	Bulletin of the American Schools of Prehistoric Research
BBVO 2	D.T. Potts, ed., *Dilmun: New Studies in the Archaeology and Early History of Bahrain,* Berliner Beiträge zum Vorderen Orient 2, Berlin, 1983.
BSOAS	Bulletin of the School of Oriental and African Studies
BTA	Shaikha H.A. Al Khalifa and M. Rice, eds., *Bahrain through the ages: the Archaeology,* Kegan Paul International, London, 1986.
CNIP 7	D.T. Potts, ed., *Araby the Blest: Studies in Arabian Archaeology,* Carsten Niebuhr Institute Publications 7, Copenhagen, 1988.
EW	East and West
JESHO	Journal of the Economic and Social History of the Orient
JOS	Journal of Oman Studies
OLP	Orientalia Lovaniensia Periodica
PSAS	Proceedings of the Seminar for Arabian Studies

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CHRISTOPHER EDENS

29. Indus-Arabian Interaction during the Bronze Age: A Review of Evidence

THE appearance of Indus materials, or materials in the Indus style or of Indus derivation, have been reported in Gulf contexts since the fifties with the Danish work on Bahrain, Failaka and the adjacent Saudi littoral that defined the Dilmun culture. Here a series of stamp seals and stone weights pointed to interaction with the Indus. The seals in particular seemed to connect the Indus with southern Mesopotamia with Dilmun as intermediary. Aside from these instruments of commercial administration, however, little else in the Dilmun cultural repertoire pointed to connection with the subcontinent, even while reflecting far more intense relations with Mesopotamia. Various writers remarked on this paucity of material evidence for Harappan connection with the Gulf and with Mesopotamia (Lamberg-Karlovsky 1972; Shaffer 1982). At the same time during the sixties Danish investigations in southeast Arabia (modern Oman and the United Arab Emirates), especially on Umm an-Nar and in the Buraimi oasis, revealed a local Bronze Age culture soon identified with Magan. Here the connection was with the Baluchistan borderlands, seen in the painted and incised pottery. These formal and stylistic parallels suggested to some that the derivation of the southeast Arabian Bronze Age was from these borderlands. To others the basic cultural unity of the two regions, or the operation of an 'interaction sphere', was specific to entrepreneurial managers of the Gulf trade (Cleuziou and Tosi 1989; Dales 1977; Lamberg-Karlovsky and Tosi 1973; Potts 1981; Thorvildsen 1963;)

In the later seventies and through the eighties, archaeological work in the region expanded exponentially, with Danish, Iraqi, American, British, French, and Italian teams surveying and excavating extensively in southeast Arabia. The Saudi Department of Antiquities also sponsored a survey and excavation in the Eastern Province. There was a concerted effort on Bahrain to salvage burial fields later obliterated by the causeway link with Saudi Arabia, as well as Larsen's (1983) important survey on the island. There was continued excavation of sites on Failaka and a French project in Qatar. This explosion of work is still only partially available in print, but has already dramatically changed perspectives on local cultural sequences and chronologies, and on extra-local connections. In particular, this new picture indicates far more intensive interaction between southeastern Arabia and the greater Indus than the earlier evidence suggested (Cleuziou 1984; Cleuziou and Tosi 1989; Tosi 1986; Weisgerber 1984). The evidence for Indus connections with the central and upper Gulf has altered far less.

The present paper[1] undertakes to summarize the available evidence for Indus relations with the Gulf region. Such a review might be organized in several different ways, for example, by geography, chronology or material, according to the overall goal of the study. Since the purpose here is not directly historical, an essay on maritime trade and social process for example, the evidence will be approached categorically, under the general rubrics of pottery, glyptics, metals, weights, stone vessels, beads, raw materials, and biota. The resulting catalogue will nonetheless be followed by a shorter interpretative discussion of spatial and chronological patterns and some suggestion of cultural dynamics. The intent of this review is to interpret the material broadly in two ways. The first is based on geography and proceeds from Possehl's notion of a 'greater Indus' that includes both the Indus alluvium and the adjacent uplands, especially of Baluchistan (Possehl 1986). Thus the range of borderland materials that find correspondence in southeast Arabia and the Gulf will be included here. (See Fig. 29.1). Moreover, the deep south of Mesopotamia (including the Susiana plain) will be considered part of the Gulf, since these regions are textually and materially known to have been in often intensive contact with the Gulf during the Bronze Age. Second, in addition to materials that are formally Harappan but found in Gulf contexts, and *vice versa*, the review will consider also those less tractable indications of contact provided by stylistic similarity, raw materials, or biotic forms. These latter indices often serve to bolster arguments of chronology and of trade, but are usually deeply ambiguous.

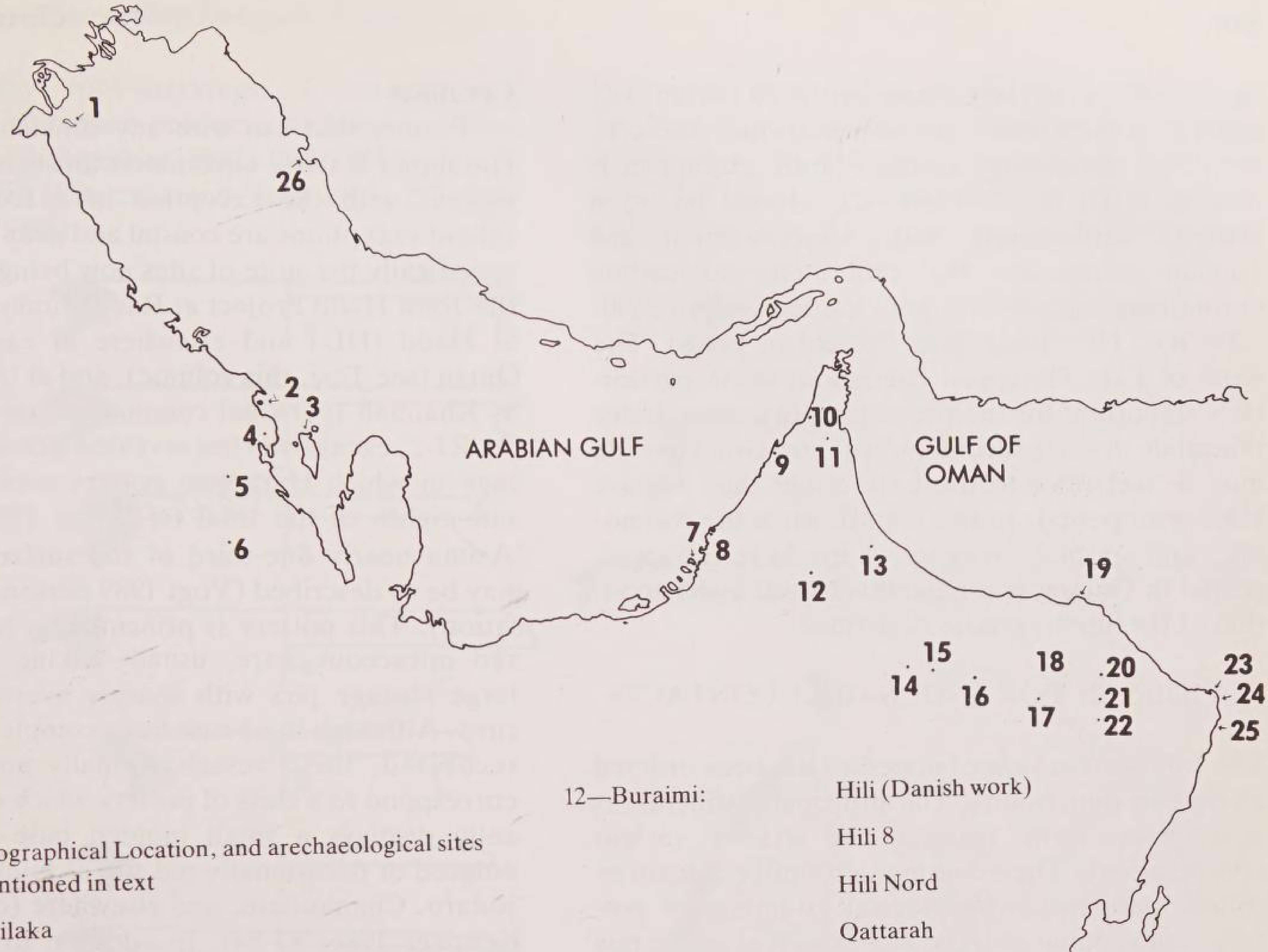
GEOGRAPHICAL AND CHRONOLOGICAL FRAMEWORK

Human geography of eastern and southeastern Arabia is deeply shaped by hydrological conditions, specifically by the availability of artesian water in the central Gulf, defining the oases of al Hasa (Hofuf, Qatif, Tarut) and Bahrain, and of orographically derived runoff and subsurface water associated with the Oman peninsula (southeast Arabia). These two regions define potential centers of agricultural population, and were in fact the two arenas of local Bronze Age societies. These two hydrological provinces, with their corresponding archaeological cultural complexes, are usually identified with the cuneiform toponyms Dilmun and Magan that are so prominent in the history of the Bronze Age maritime trade.

Of the various archaeological regions around the Gulf, only southern Mesopotamia is well understood chronologically, though here the correlation of changing material culture with the periodization of political history often remains problematical. Elsewhere, chronological difficulties abound. In the central Gulf the "long chronology" of the Danish investigators (Bibby 1970; Mortensen 1971) has been considerably shortened, compressing the Qala'at al Bahrain City I-II sequence into the later third millennium to the earlier second millennium. This revision rests largely on ceramic parallels with the Mesopotamian sequence, buttressed by a relatively small number of other lines of evidence—the so-called Amorite tablet, *série récente* and *série tardive* carved soft stone vessels, Umm an-Nar and Wadi Suq pottery, early second millennium texts in southern Mesopotamia with Gulf stamp seal impressions, and so forth. This chronological framework leaves the early and mid-third millennium poorly defined in the central Gulf. The *série ancienne* carved vessels, Early Dynastic style statuary on Tarut, and Early Dynastic pottery from Tell Ramadh all indicate mainland settlement at this time, an occupation moreover that seems to lack a counterpart on Bahrain. But this cannot be well-grounded in a detailed chronological sequence or settlement matrix (for summaries of the archaeological situation on Bahrain and the adjacent Saudi coast, see Cleuziou 1988; Larsen 1983; Potts 1981; 1985, i.p; Zarins 1989; among others).

The situation in southeast Arabia is somewhat, better, thanks largely to the key sequence at Hili 8, spanning the late fourth to early second millennium. Here Cleuziou defines three major architectural and ceramic periods, specified by radiocarbon dates (Cleuziou 1980, 1984, i.p.). This sequence has the virtue of coordinating previous work in southeast Arabia, mainly on tombs or in survey, and of providing a finer periodization of the southeast Arabian Bronze Age than had previously been possible. In particular, for present purposes, the second half of the Hili 8 sequence, i.e. periods IIf-g and III, collates most of the regional evidence for Harappan contacts in the Umm an-Nar and Wadi Suq periods. However this one sequence should not heedlessly be extended to all of southeast Arabia, especially since some degree of ceramic regionalization is apparent from survey and excavation results (for general reviews of the Bronze Age archaeology of southeast Arabia, see Cleuziou 1981, 1984, i.p., Cleuziou and Tosi 1989; Vogt 1985a).

The Indus sequence is fairly well worked out comparatively but not absolutely. The cycle of regional cultures of the Early Harappan coallescing to form the Mature Harappan, followed by the regionalization of the Late Harappan, is fairly secure. The chronology of these developments and


1
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ARABIAN GULF
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GULF OF OMAN
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Fig. 29.1. Geographical Location, and arechaeological sites mentioned in text

1—Failaka	
2—Tarut:	
	Rufayah
3—Bahrain:	
	Qala'at Al Bahrain
	Barbar Temple
	Diraz
	An-Nassariya
	'Ali
	Sar El Jisr
	Hajjar
	Horat Unqa
4—Dhahran:	Dhahran Tumulus field
5—Abqaiq:	Abqaiq Tumulus Field
6—Hofuf:	Tell Ramadh
7—Umm an-Nar	
8—Ras Ghanadha	
9—Tell Abraq	
10—Shimal	
11—'Asima	
12—Buraimi:	Hili (Danish work)
	Hili 8
	Hili Nord
	Qattarah
	Hafit
	Mazyad
13—Wadi Suq:	Falaj Al Qaba
14—Baat	
15—'Amlah:	'Amlah 12
16—Bahla:	BB6
17—Wadi Andam:	Andam 28
18—Samad:	Maysar 1
	Maysar 4
19—Ras Al Hamra: (Qurum)	RH-5 RH-10
20—Wadi Batin:	Batin 1
21—Wadi Ibra':	Ibra 2
22—Tawi Silaim	
23—Ras Al Hadd:	HD-1
24—Ras Al Junayz	RJ-2
	RJ-3
25—Suwayh:	SWY-3
26—Bandar Bushehr	

the specific materials characteristic of certain key aspects of the process are far less secure. The conventional chronology of the Mature Harappan is usually given as 2500-1800 B.C., based on often tenuous cross-dating with Mesopotamian and Iranian sequences; the calibrated radiocarbon chronology suggests the more limited span of 2600-2200 B.C. (Brunswig 1975 Possehl in press). The issue of Late Harappan configurations in particularly important for the present inquiry, since Indus materials in early second millennium Gulf contexts may in fact refer to the Late rather than Mature Harappan period. In this regard, while the chronology and specific character of the Late Harappan period in Gujarat is comparatively well understood, that of the Sindh remains ill-defined.

EVIDENCE FOR INDUS-GULF CONTACTS

The following review of materials has been ordered along two dimensions. The principal distinction is descriptive—form, material and style in various combinations. The resulting descriptive categories follow standard archaeological groupings of pottery, seals, metal objects, etc. as well as exotic raw materials such as lapis lazuli, tin and ivory. Buried within these descriptive categories, and cross-cutting them, is a scale of confidence that describes the inferential strength of the Harappan connection. On this scale, several ceramic forms and a few glyptics are most securely Harappan in origin, while the majority of artifacts are variably less certain, Harappan or Harappan-derived. Other materials are only possibly from the greater Indus. An assessment of the degree of inferential ambiguity exhibited by the contents of the descriptive categories is essential to any proposed culture history built upon these lines of evidence. Inferential ambiguity is summarized in the catalogue and is also taken up in the concluding section of this review. The concluding section also sketches chronological-geographical variability and the historical-sociological implications of the patterns revealed in the descriptive catalogue. The catalogue reviews only those categories of materials found in the Gulf with a Harappan connection, or *vice versa*. Excluded from the review are a number of objects or motifs found in Mesopotamia but not the Gulf: dice, figurines and statuary, the trefoil motif, specific glyptic forms and motifs, etc. (Dales 1968; During-Caspers 1972a, 1976; Spycket, 1981: 123-25).

Ceramics

Pottery that can with any conviction be called Harappan is fairly uncommon throughout the Gulf region, with the exception of a few sites. The salient exceptions are coastal and near coastal sites, specifically the suite of sites now being explored by the Joint Hadd Project at Ras al Junayz (RH), Ras al Hadd (HD) and elsewhere in eastern littoral Oman (see Tosi, this volume), and at 'Asima in Ras al Khaimah (personal communication Vogt 1989). At RJ-2, excavation has revealed a ceramic assemblage in which Harappan pottery comprises about one-eighth of the total (cf. Méry 1988), while at 'Asima nearly one-third of the surface collection may be so described (Vogt 1989 personal communication). This pottery is principally a black-slipped red micaceous ware, usually taking the form of large storage jars with sharply everted or rolled rims. Although in no case has a complete form been recovered, these vessels formally and metrically correspond to a class of pottery which characteristically displays a small molded base and a dark colored or occasionally red slip as found at Mohenjodaro, Chanhudaro, and elsewhere (cf. Dales and Kenoyer 1986: 83-84). In addition to 'Asima and RJ-2 (Fig. 29.2:5-6), sherds of this fabric and form are reported from Ras al Hadd (HD-1; Reade and Méry 1988; Reade 1989) and SWY-3, a shell midden south of Ras al Junayz on the eastern Omani coast (Edens in press); Ras Ghanadha 1 (Fig. 29.2:3), Shimal (Vogt and Franke-Vogt 1987: 87-88), and possibly Umm an-Nar (Fig. 2.10) on the Emirates coast; Hili 8 periods IIf and III (Fig. 29.2:1-2), Amlah 12 (Fig. 29.2:4) and possibly Wadi Ibra 2 (Fig. 29.2:8) in the interior. The incised rims that Potts (this volume) presents from Tell Abraq belong to a distinct but related Harappan form and are again distinguishable from the local ceramic corpus.

A series of formally similar rims in local fabrics also occur through southeast Arabia. These rims sometimes are distinguished by incised marks. Such rims are reported for Maysar 1 (pl.29.1; see Weisgerber 1981: 218, Abb. 52; 1984), Baat (Fig. 29.2:7), and Batin 1 (Fig.29.2:9). Other rim forms, again in local fabrics and often with incised marks, are occasionally cited in this connection (e.g. at BB6 [Fig.29.2:11, 13], Andam 28 [29.2:12]. Formally and metrically, however, they do not belong to the series of Harappan-related materials discussed here. Some vessels in local fabrics of both forms display rope-markings, a characteristic shared with Harappan products, at Maysar 1 (Fig. 29.2:14; see Weisgerber 1981: 218; 1984), Hili 8 periods IIf-III (Cleuziou and Vogt 1985: 272) and RJ-2 (Mery 1988).

In addition to these storage jars, other Harappan and Harappan-derived ceramics also occur in smaller amounts. A painted black on a red slip pyriform jar whose form and decorative style is undoubtedly Harappan but whose fabric belongs to

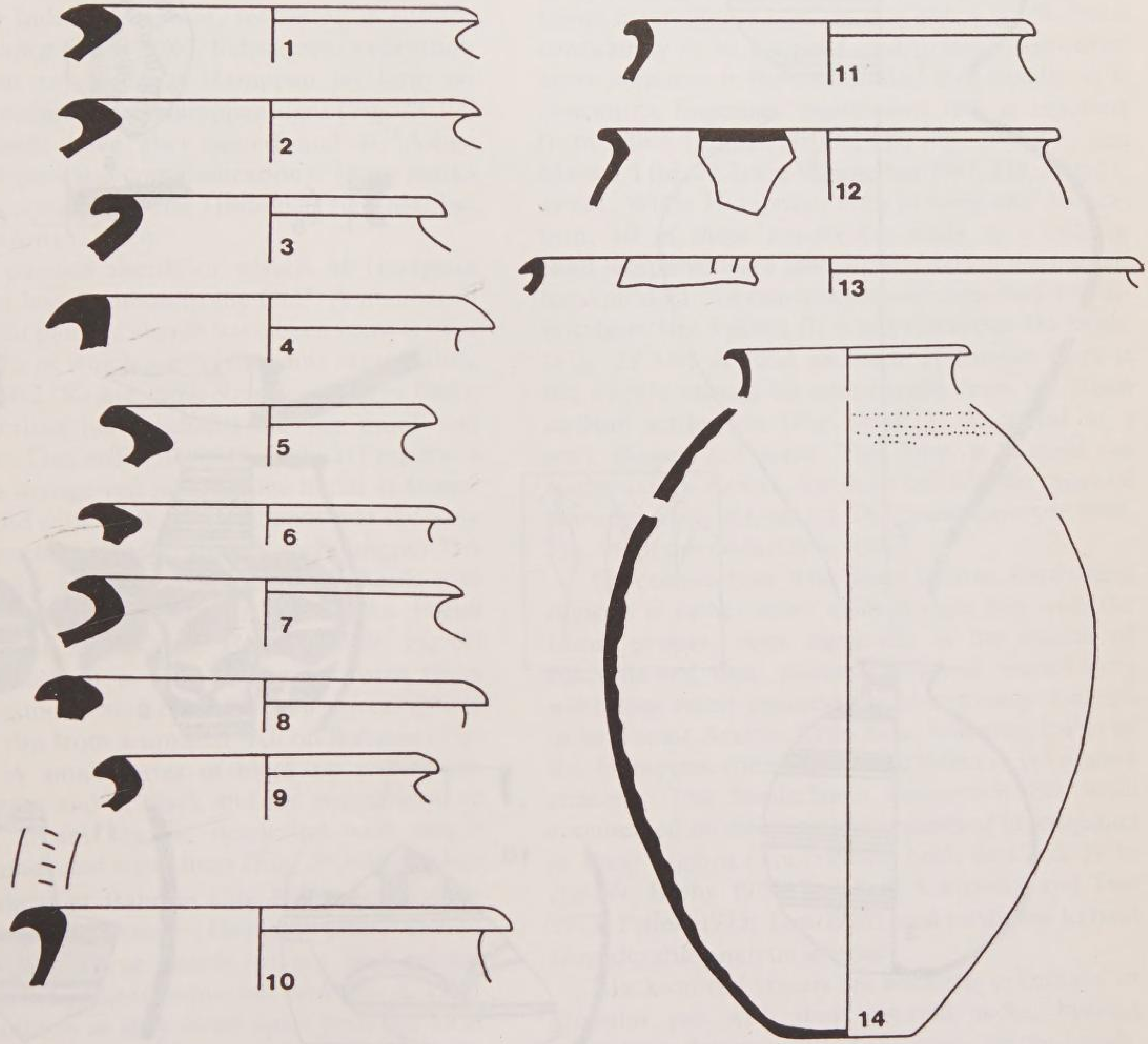

Fig. 29.2. Harappan and Harappan-like storage jars (nr. 1-13 at 1/4 size, nr. 14 at 1/8 size)

1—Hili 8, Period III (from Cleuziou and Tosi 1989, Fig. 11.1)
2—Hili 8, Period IIf (from Cleuziou and Tosi, 1989, Fig. 11.2)
3—Ras Ghanadha (from Tikriti 1985, Fig. 13B)
4—'Amlah 12 (from De Cardi *et al.* 1976, Fig. 20.187)
5—RJ-2 (from Mery 1988, Fig. 34.12)
6—RJ-2 (from Mery 1988, Fig. 34.11)
7—Ba'at (from Frifelt 1975, Fig. 34f)
8—Ibra 2 (from Hastings *et al.* 1975, Fig. 21B)
9—Batin 1 (from Hastings *et al.* 1975, Fig. 16H)
10—Umm An-Nar (from Frifelt 1975, Fig. 13g)
11—BB-6 (from Hastings *et al.* 1975, Fig. 9J)
12—Andam 28 (from Hastings *et al.* 1975, Fig. 18G)
13—BB-6 (from Hastings *et al.* 1975, Fig. 9A)
14—Maysar 1 (from Weisgerber 1984, Fig. 24.4)

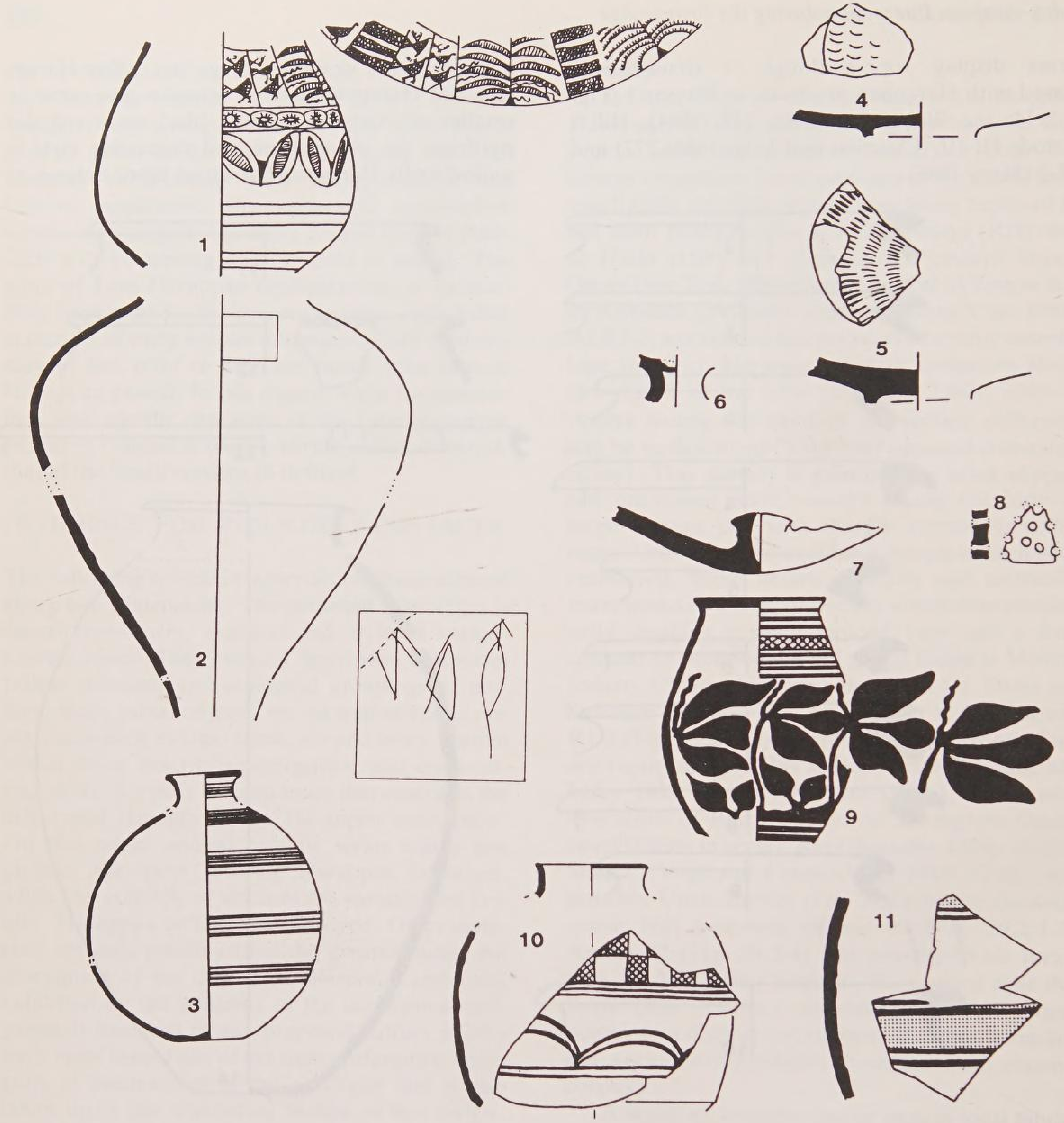

Fig. 29.3. Harappan-like painted pottery and other forms (nr. 1-3 at 1/8 size, nr. 4-11 at 1/4 size)

1—RJ-2 (from Mery 1988, Fig. 35.1)
2—RJ-2 (from Cleuziou and Tosi 1989a, Fig. 20)
3—Shimal 6 (from De Cardi 1988, Fig. 11)
4—Hili 8, Period III (from Cleuziou and Tosi 1989, Fig. 11.5)
5—Hili 8, Period IIf (from Cleuziou and Tosi 1989, Fig. 11.3)
6—Hili 8, Period IIf (from Cleuziou and Tosi 1989, Fig. 11.4)
7—Umm An-Nar (from Frifelt 1975, Fig. 13a)
8—RJ-3 (from Mery 1988, Fig. 34.6)
9—Tarut (from Zarins 1989, Fig. 6.20; Burkholdeer 1984, pl. 30-31)
10—'Ali Tumulus (from Hojlund 1989, Fig. 6)
11—Qala'at Al Bahrain (from Hojlund 1989, Fig. 2)

the cream ware that typifies the locally produced pottery at RJ-2 (Fig. 29.3:1). In all respects this remains a unique discovery in southeast Arabia, though some of the decorative elements are repeated in a black-on-red jar from a burial at Hili (see below). To this site also belongs the now famous sherd with Indus inscription, recovered in surface reconnaissance (Tosi 1986). Subsequent excavation at RJ-2 has produced at Harappan jar form on which are incised three Harappan signs (Fig. 29.3:2) Incised sherds have also been found at ‘Asima (Vogt 1989 personal communication). These marks are not necessarily in the Harappan sign list, but such an identity is likely.

Other painted sherds or vessels of Harappan affinity are less common in the Gulf. A number of black on red painted sherds have been recovered at HD-1, some of which are on the same cream fabric found at RJ-2 (Reade 1989; Reade and Mery 1988). The decoration here includes the ‘sun motif’ and vegetation. DeCardi (1988: 46, Fig. 11) reports a micaceous orange-red jar from the burial at Shimal 6, decorated with black painted bands that she compares to pottery from Lothal A and Rangpur IIA (Fig. 29.3:3). Further afield, painted sherds with Indus affinity occur on Bahrain and Failaka. Frifelt (1986: 129-31, Fig. 32; cf. Hojlund 1989, Fig. 6) presents most of a fine orange jar with black painted festoons and cross-hatched checkerboard on cream slip from a tomb at ‘Ali on Bahrain (Fig. 29.3:10). A small series of black on red or yellowish cream and of black and red polychrome on yellowish cream sherds, decorated with simple painted bands and wavy lines (Fig. 29.3:11), occurs at the Qala’at at Bahrain City II (phases A-C in Hojlund’s periodization; Hojlund 1989, Larsen 1983: 237-39). These sherds do not find precise parallels in the greater Indus, but probably do refer to that tradition as they stand apart from the local ceramic production in fabric and surface treatment. To this series should be added a sherd from the same site decorated with hatched squares set in a diagonal gridwork (Bibby 1957, Fig. 15 lower right) that closely parallels a painted sherd at Mohenjo-daro (Mackay 1937 p. LXIX. 20). On Failaka at site F3 period I, there is a single dense red ware sherd with black painted bands and pendant wavy line on light brown ground, This sherd is similar to the group of sherds from the Qala’at al Bahrain that have already, been noted (Hojlund 1987: 100-101, Fig. 435).[2] Finally, a small buff ware beaker from Rufayah on Tarut is decorated with black painted vegetation (Fig. 29.3:9).

Few other non-painted ceramics with Harappan connection are reported in the Gulf. A single sherd of a perforated vessel is recorded from the surface of RJ-3 (Fig. 29.3:8). Although a typical form of Indus assemblages, the present sherd is too small confidently to be assigned to a ‘grater’. Somewhat more common is the pedestalled dish usually with concentric fingernail impressions that is reported from Hili 8 (phases IIf and III; Fig. 29.3:4-5) and Maysar 1 (pl. 29.2; see Weisgerber 1981; 218, Abb 51; 1984). While Harappan, both in form and decoration, all of these vessels are made of a reddish sand tempered ware that corresponds to the normal local product. An example without impressed decoration from Hili 8 phase IIf is in a Harappan-like fabric (Fig. 29.3:6) A final probable Harappan form is the deeply curved lid with handle from the Umm an-Nar settlement (Fig. 29.3:7), described as a grey slipped red ware. This form is unusual for southeastern Arabia, but does fall into the range of Harappan lids in form (cf. Dales and Kenoyer 1986, Fig. 96) if not certainly in fabric.

The connection with Indo-Iranian borderland regions is rather more evident than that with the Indus proper, seen especially in the classes of black-on-red fine, painted gray and incised gray ware that occur prominently in mortuary contexts of southeast Arabia. Even here, however, traces of the Harappan connection are evident in decorative content. The borderlands connection has been commented on since the early phases of investigation in these regions (Thorvildsen 1963; de Cardi 1970: 268-69; Bibby 1970: Lamberg-Karlovsky and Tosi 1973; Frifelt 1975; Tosi 1976), and continues to hold considerable analytic interest.

Black-on-red vessels are normally cylindrical or globular jars with short everted necks, bearing geometric design motifs (chevrons, zigzag bands, flame patterns, step patterns) and only occasionally naturalistic motifs (such as pipal/willow leafs, zebu, oryx, friezes of caprids [(Fig. 29.5.4]) confined to the upper part of the vessel. While the more common motifs bear a general comparison with southeast Iranian wares, some point more toward the Indus. These include goats among trees, fish, peacocks,[3] dotted squares, the ‘sun motif’, pipal leaves and trees (Fig. 29.4:14, 6-8). The black painted decoration is executed on an unslipped red ware or a red slipped red or buff ware; a black on

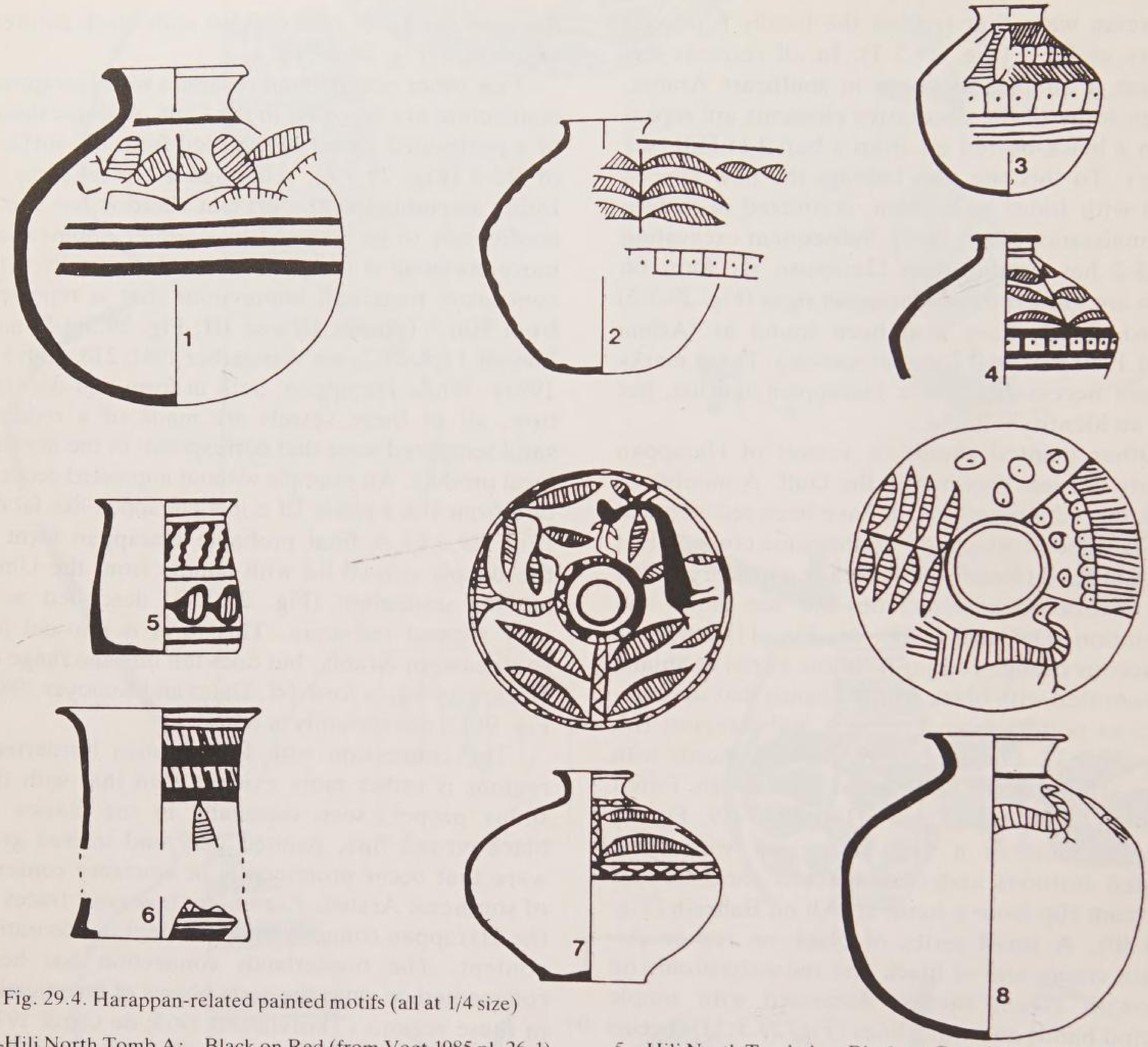

Fig. 29.4. Harappan-related painted motifs (all at 1/4 size)

1—Hili North Tomb A; Black on Red (from Vogt 1985 pl. 26.1)

2—Hili North Tomb A; Black on Red (from Vogt 1985, pl. 25.4)

3—Hili North Tomb A; Black on Red (from Cleuziou and Tosi 1989, Fig. 10.5)

4—Hili; Black on Red (from Frifelt 1975, Fig. 15d)

5—Hili North Tomb A; Black on Gray (from Vogt 1985, pl. 26.3)

6—Hili North Tomb A; Black on Red (from Vogt 1985, pl. 25.7)

7—Hili North Tomb A; Black on Red (from Vogt 1985, pl. 25.1)

8—Hili North Tomb A; Black on Red (from Vogt 1985, pl. 26.4)

buff ware also occurs as a variant, i.e. by omission of the red slip.

Black-on-gray vessels are usually cannisters, though globular pots also occur. Decoration consists of multiple registers of iterated geometric (hatched or solid triangles, vertical straight or wavy lines) and naturalistic (especially caprids) motifs, that cover the entire vessel surface. Square shouldered cannisters are reported from Hili (Fig. 29.5:1-3) and Amlah 1 (de Cardi *et al.* 1976: 122, Fig. 17.18-27). More rounded shouldered and more open cannisters occur in Umm an-Nar burials (Frifelt 1975, Fig. 11a, b, d) as well as at Hili (Fig. 29.5:5; see Bibby 1967, Vogt 1985 pl. 26.5), along with miniature globular jars (in Tomb A, Hili North; Vogt 1985, pl. 25.10). A black-on-gray bowl and two beakers, so far unique in southeast Arabia, also occur in the latter context (Fig. 29.5:6, 29.4:5). In the central Gulf black-on-gray vessels are somewhat less common, being reported from

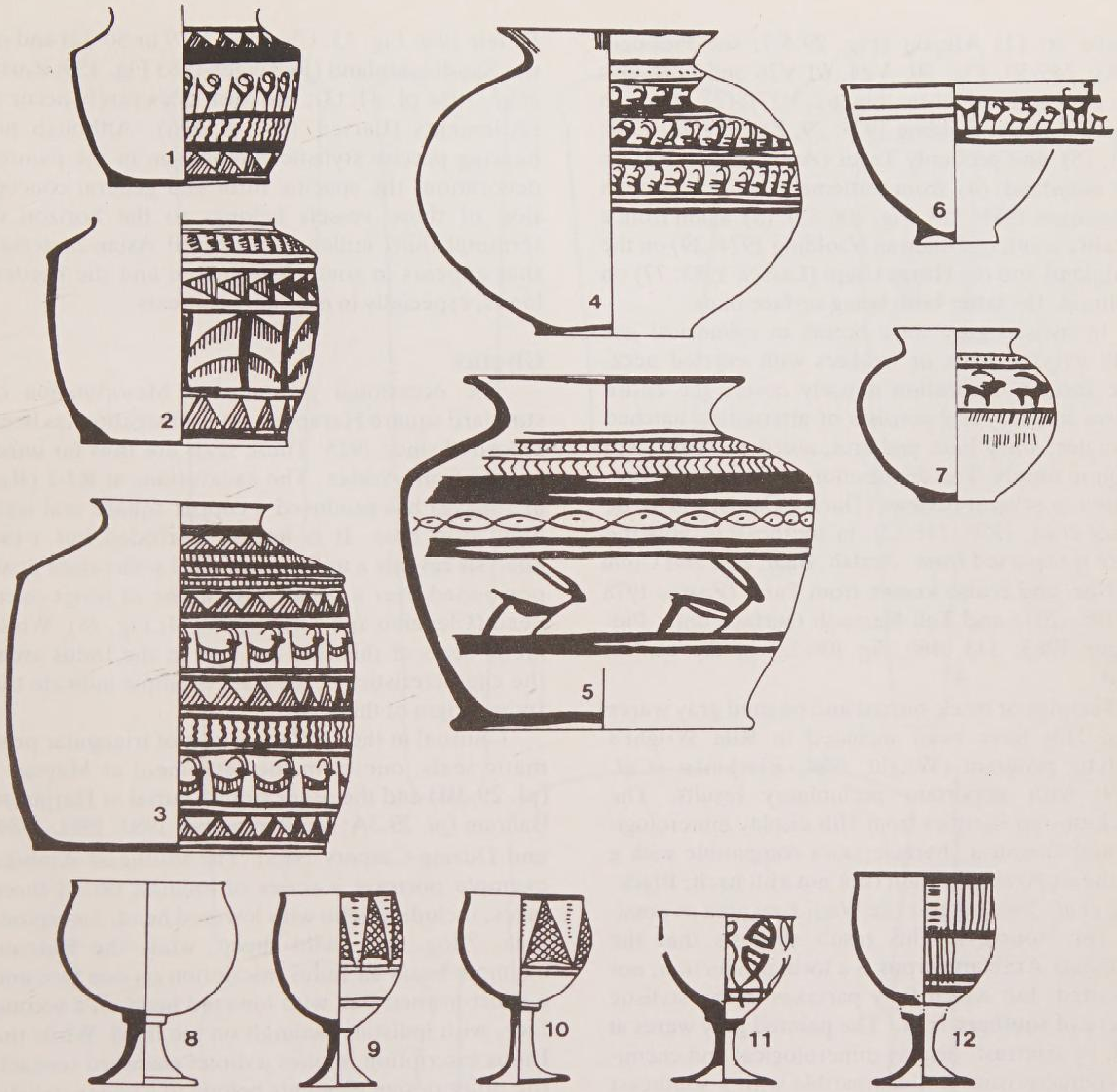

Fig. 29.5. Pottery with Baluchistan connections (all at 1/4 size)

1—Hili; Black on Gray (from Bibby 1970: 301 middle left)

2—Hili; Black on Gray (from Bibby 1970: 301 bottom left)

3—Hili; Black on Gray (from Bibby 1970: 300 top)

4—Hili Tomb M; Black on Red (from Cleuziou and Tosi 1989, Fig. 8)

5—Hili North Tomb A; Black on Gray (from Vogt 1985, Fig. 26.5)

6—Hili North Tomb A; Black on Gray (from Vogt 1985, Fig. 25.8)

7—Abqaiq; Black on Gray (from Zarins 1989, Fig. 11.6)

8—'Ali; Fine Red (from Cleuziou 1989, Fig. 30)

9—'Ali; Black on Fine Red (from Cleuziou 1989, Fig. 31)

10—'Ali; Black on Fine Red (from Cleuziou 1989, Fig. 32)

11—Dhahran Tumulus field; Black on Fine Red (from Zarins 1989, Fig. 13.6)

12—Dhahran Tumulus Field; Black on Fine Red (from Zarins 1989, Fig. 13.12) tombs at: (1) Abqaiq (Fig. 29.5:7; see Piesinger 1983: 249-50, Fig. 50. V24, 61.V26 and note also the copy in local fabric, Fig. 61. V27); (2) Dhahran (surface finds, Golding 1974: 29, Zarins *et al.* 1984: 27); (3) and probably Tarut (Anon. 1975: 148) on the mainland; (4) from settlements at Tell Ramadh (Piesinger 1983: 313, Fig. 106.53); (5) again from a locality south of Dhahran (Golding 1974: 29) on the mainland and (6) Horat Unqa (Larsen 1983: 77) on Bahrain, the latter both being surface finds.

In incised gray ware occurs in cylindrical jars with everted neck or beakers with everted neck. The incised decoration densely covers the entire vessel surface, and consists of alternating hatched triangles, wavy lines and arcs, arced chevrons, and sagging lintels. The distribution of this ware is presented in several reviews (During Caspers 1970, de Cardi *et al.* 1976: 118-22); in southeast Arabia the ware is reported from 'Amlah, Baat, Hili and Umm an-Nar, and is also known from Tarut (Zarins 1978 nr 198, 201) and Tell Ramadh (surface only; Piesinger 1983: 313, 460, fig 106-52) in the central Gulf.

Samples of black-on-red and painted gray wares from Hili have been included in Rita Wright's analytic program (Wright 1984, Blackman *et al.* 1989) with important preliminary results. The black-on-red samples from Hili display minerological and chemical characteristics compatible with a southeast Arabian origin (but not Hili itself; Blackman *et al.* 1989 suggest the Wadi Jizzi area as possible clay sources). This result suggests that the southeast Arabian corpus is a local production, not imported, but which fully partakes in the stylistic sphere of southern Iran.[4] The painted gray wares at Hili, by contrast, display minerological and chemical characteristics not compatible with a southeast Arabian origin but rather are chemically comparable to the Emir 2 sample from Iran (Blackman *et al.* 1989: 72), and so are likely to represent imports. Whether this important distinction can be extended throughout southeast Arabia for each class of painted wares remains uncertain.

In the central Gulf a rare series of painted fine ware footed goblets point to a later connection with southeastern Iran and Baluchistan. Made of a fine red ware with red slip, or occasionally of a gray ware, and often painted in black geometric motifs (Fig. 29.5:8-12), these vessels are normally encountered in tombs on Bahrain (Bibby 1965 Fig. 3; During-Caspers 1980 pl V; Ibrahim 1982 Fig. 38. 3; Frifelt 1986 Fig. 33; Cleuziou 1989 nr 30-32) and on the Saudi mainland (Piesinger 1983 Fig. 139; Zarins *et al.* 1984 pl. 41.13); the form does rarely occur in settlements (Larsen 1983 pl 51n). Although not bearing precise stylistic comparison in the painted decoration, the specific form and general conception of these vessels belongs to the horizon of terminal third millennium central Asian materials that appears in southeastern Iran and the borderlands, especially in mortuary contexts.

Glyptics

The occasional presence in Mesopotamia of standard square Harappan seals of steatite has been recorded since 1925. These seals are thus far unreported from Arabia. The excavations at RJ-2 (Ras al Junayz) has produced a copper square seal with high loop boss. It is heavily corroded but x-ray analysis reveals a unicorn or bovid with raised head positioned over a stand, with a line of script overhead (Cleuziou and Tosi 1989a: 14, Fig. 18). While metal seals of this sort are rare in the Indus area, the characteristics of the RJ-2 example indicate the Indus origin of this seal.

Unusual in the Gulf are a pair of triangular prismatic seals, one from the settlement at Maysar 1 (pl. 29.3B) and the other from a burial at Hajjar on Bahram (pl. 29.3A; see Weisgerber 1980, 1981, 1984, and During-Caspers 1983). The southeast Arabian example portrays a series of animals on all three faces, including zebu with lowered head, ?scorpion, ibex, ?dog, and ?wild sheep, while the Bahrain example bears an Indus inscription on one face and a short-horned bull with lowered head on a second face, with indistinct animals on the third. While the Indus inscription implies a direct eastward contact, the other design elements belong to a wider stylistic realm, especially the ?scorpion, but also the bull with lowered head, which appears on the 'early' Gulf stamp seals as well as the round stamp seal with Indus inscription (see below); the form of these seals does not conform either to Indus norms or to those of the Gulf.

Several pyramidal stamp seals, made of copper or chlorite, at RJ-2 are characterized by geometric patterns, most usually hatching (Cleuziou and Tosi 1986, Fig. 23; 1988, Fig. 18.2; 1989a, Fig. 19.1); the excavators draw attention to similar design on glyptics from Mohenjodaro. These seals are unusual in the Gulf, though some seals in the Failaka corpus do bear somewhat similar but less regular

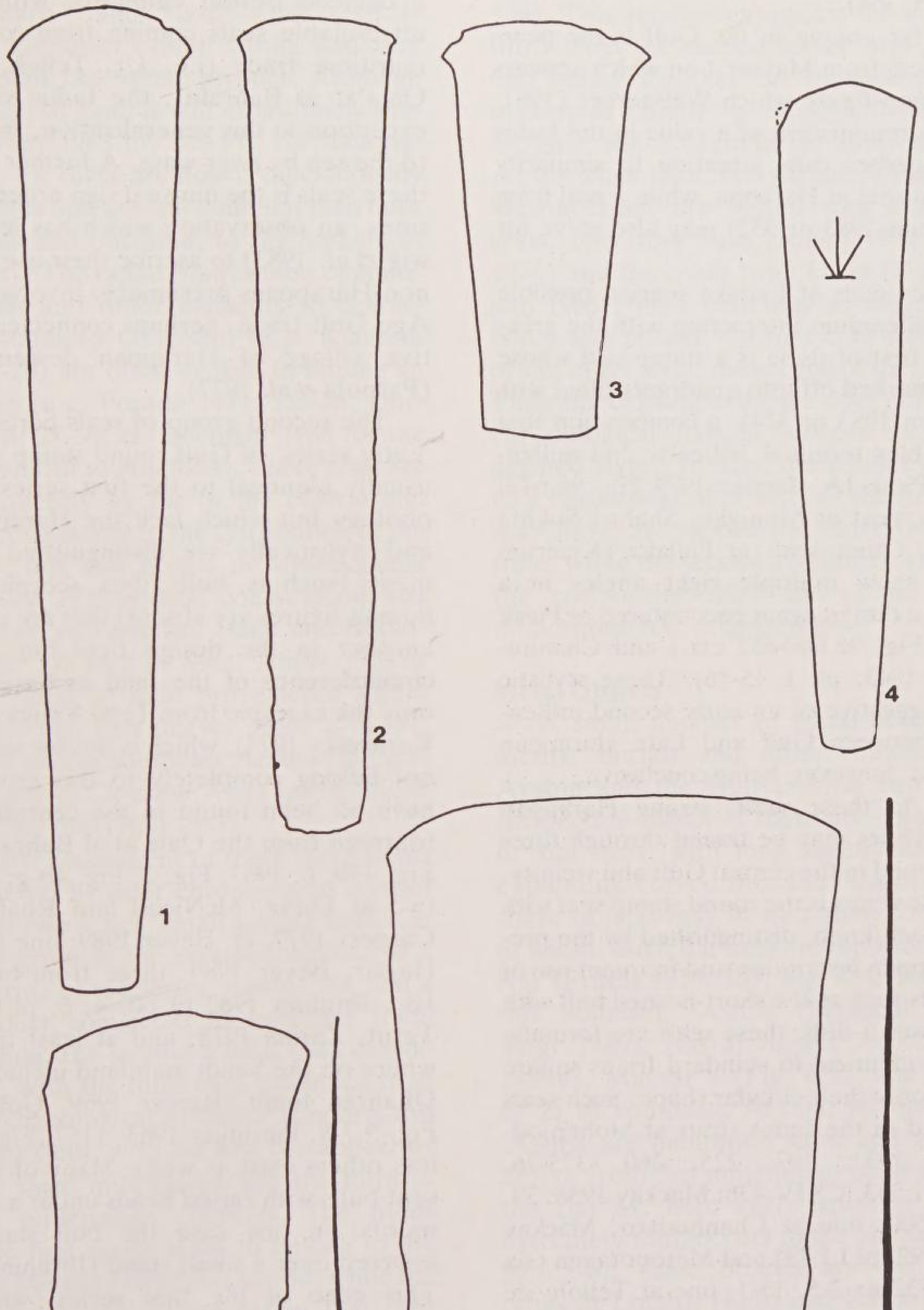

Fig. 29.6. Metal forms (all at 1/2 size)

1—Maysar 4:3 (from Weisgerber 1981, ABB 34)

2—Maysar 4:2 (from Weisgerber 1980, ABB 78.11)

3—Maysar 1 (from Weisgerber 1980, ABB 78.5)

4—Diraz (from Cleuziou 1989, Fig. 39)

5—Shimal 6 (from De Cardi 1988, Fig. 14.9)

6—Shimal 6 (from De Cardi 1988, Fig. 14.8) hatching on formally different stamp seals (Kjaerum 1983 nr 325, 364).

Also, thus far unique in the Gulf is the pear-shaped stamp seal from Maysar 1 on which appears a skematic human figure which Weisgerber (1981: 218) suggests is reminiscent of a value in the Indus sign list. Weisgerber calls attention to similarity with an atypical seal at Harappa, while a seal from Failaka (Kjaerum 1983 nr 332) may also serve for comparison.

Several other seals at Failaka suggest possible early second millennium interaction with the greater Indus. The first of these is a stamp seal whose design field is marked off into quadrants filled with circles (Kjaerum 1983 nr 324), a composition that formally resembles terminal 3rd/early 2nd millennium seals at Pirak IA (Jarrige 1979 Fig. 96.647) and which also exist at Munigak, Shahr-i Sokhta and elsewhere. Other seals at Failaka (Kjaerum 1983 nr 365) show multiple right angles in a quadrate field, a design again encountered at Pirak (Jarrige 1979, Fig. 96.649-652 etc.) and Chanhudaro (Mackay 1943, pl. L.15-16). These stylistic parallels are suggestive of an early second millennium contact between Gulf and Late Harappan societies without, however, being conclusive.

In addition to these seals, strong Harappan influence on glyptics may be traced through three series of seals found in the central Gulf and vicinity. The first of these series is the round stamp seal with a high bossed back/knob, distinguished by the presence of a Harappan inscription and frequent use of Harappan motifs such as the short-horned bull with head lowered over a dish; these seals are formally and stylistically identical to standard Indus square seals excepting only their circular shape. Such seals have been found in the Indus (four at Mohenjodaro, Marshall 1931: 197, 225, 260, 375-76, pl CX.309, CXII.383, CXIV.478; Mackay 1938: 39, 343, pl XCVI.500; one at Chanhudaro, Mackay 1943: 50, 148, 292, pl LI.23) and Mésopotamia (six at Ur, Gadd 1932 nr 2-5, 15-1; one at Telloh, de Sarzec and Heuzey 1891 pl 30.3a-b; one at Susa, Amiet 1972 nr 1643; three without provenience within Mesopotamia, Gadd 1932 nr 17-18, Langdon 1932; one without provenience within Luristan, Amiet 1973: 222) as well as on Bahrain (two, Brunswig *et al.* 1983, nr 8-9) and Failaka (two, Brunswig *et al.* 1983, nr 6-7). This distribution is fairly even with just over half coming from southern Mesopotamia and Elam, the remainder from the Gulf and the Indus; this distribution also shows a decided littoral emphasis, with almost all the attributable seals coming from towns engaged in maritime trade (i.e. Ur, Telloh, Susa, Failaka, Qala'at al Bahrain); the Indus sites provide the exception to this generalization, though still linked to the sea by river ways. A further characteristic of these seals is the unusual sign order of their inscriptions, an observation which has lead some Brunswig *et al.* 1983) to ascribe their use by linguistically non-Harappans presumably involved in the Bronze Age Gulf trade, perhaps connected with the putative village of Harappan descent near Lagash (Parpola *et al.* 1977).

The second group of seals pertinent here is the early series' of Gulf round stamp seals, which are usually identical to the first series in dorsal morphology but which lack the Harappan inscription and stylistically are distinguished by design elements (such as, bulls, ibex, scorpions, birds, feet; human figures are absent) that are unrelated to one another in the design field but rather use the circumference of the field as baseline. Excepting only the example from Tepe Yahya IVB (Lamberg-Karlovsky 1971), which is double sided and so does not belong completely to this group, these seals have all been found in the central Gulf (at least fourteen from the Qala'at al Bahrain, Bibby 1957, Fig. 13b, c; 1967, Fig. 2, Fig. 4b-g; cf. Beyer 1989; two at Diraz, McNicoll and Roaf n.d.; During-Caspers 1977; cf. Beyer 1989; one from a burial at Hajjar, Beyer 1989; three from burials at Sar el Jisr, Ibrahim 1982 pl 60. 4, 6, pl 61.3; one from Tarut, Zarins 1978; and at least three from elsewhere on the Saudi mainland including one from a Dhahran tomb (Barger 1969, Golding 1974: 29, Fig. 5.7-8, Piesinger 1983: 1157, Fig 186.11; doubtless others exist as well). Many of these seals present bulls with raised heads under a variety of other motifs; in one case the bull stands with head lowered over a small stand (Ibrahim 1982 pl 61.3). This echo of the first series, where the Indus inscription is replaced by the other motifs, suggests the derivation of the secnod from the first series (cf. During-Caspers 1976: 24-25, 1983: 667-69).

The third series of seals is the "late" or "standard" Gulf round stamp seal, formally characterized by a low wide boss with one to three incised lines and four dotted-circles. These seals are stylistically distinctive, showing a wide compositional variety that need not be presented here (see Porada

1971, Kjaerum 1980, 1983). The stylistic separation between the "early" and "late" Gulf seals is important since the latter exhibit strong similarity with Mesopotamian and Syrian glyptics. Although the bull with lowered head is still occasionally present (e.g. Kjaerum 1983 nr. 89, 91, 174; During-Caspers 1976 pl. 5), these are now compositionally secondary elements and are less common than bulls with raised heads and bucrania, to say nothing of gazelles and ?ibex. The radial composition of multiple animal heads and other elements so characteristic of the standard Gulf seal (e.g. Kjaerum 1983 nr. 1-3, 23-29) are often evoked in finding an Indus connection (e.g. Porada 1971: 335-36, During-Caspers 1976: 27-30; cf. Boehmer 1986 for the extension of this motif to Anatolia). These seals are found most frequently by far in the central and upper Gulf, corresponding to the distribution of the Dilmun culture, but also occurs in Mesopotamia (seven at Ur, Gadd 1932:nr 8-14; one at Ischali and two others without provenience, Hallo and Buchanan 1965: 206 nr 14; four at Susa, Amiet 1972:nr 716-1718; one other without provenience within Iran, Erlenmeyer and Erlenmeyer 1966: 27 n. 37, Fig. 17.19), and also in southeast Arabia (the seal from a Mazyad grave, Cleuziou 1981) and of course at Lothal, a surface find (Rao 1963).

Proper cultural assessment of these three series of seals is hindered by poor chronological control and, for the first two series, small sample sizes. On largely *a priori* grounds the received opinion is a successive ordering of the series, making the first a Harappan product connected to maritime trade with Mesopotamia, the second a local Gulf derivation of the first, with the third then stemming from the second. Archaeological evidence supports this scheme to some extent, with the first two appearing largely in later third millennium and the third in earlier second millennium contexts. The Indus examples of the first series seem to belong to the later part of the Mature Harappan period, while the Mesopotamian instances, to the extent that contextual evidence is available, fall in the Akkadian to Ur III time range. Those found in the Gulf itself are perhaps slightly later—basal City II at the Qala'at al Bahrain finds a terminal third millennium date while the Failaka sequence begins in the initial second millennium. The second and third series are best fixed at the Qala'at al Bahrain, where a group of the second series appears in basal City II contexts while examples of the third series occur in higher levels of City II (Bibby 1986: 111, 114). This sequence supports the derivation of the third from the second series, and places the first two series together on Bahrain at the time of maximum Indus presence/influence (thus the weights, which begin in the upper levels of City I). At the same time, two published texts from greater Mesopotamia are sealed with Gulf style stamp seals, one from Susa (Amiet 1974: 109; Lambert 1976) and the other from Larsa (Hallo and Buchanan 1965); while both may be assigned to the early Isin-Larsa period, the first is an elaborate example of the older style, the second of the 'standard' style. Thus the existing evidence does not permit a clean chronological division between these two broadly defined styles. In sum, the slender evidence points to a chronological priority of the first series, which may have overlapped the older Gulf seal style in time, while the second and third series tent to fall at the end of the third and in the earlier second millennium B.C. respectively.

Metal Objects

A small number of metal objects from settlements, burials and other contexts in southeast Arabia and the Gulf Littoral betray a Harappan connection. Most of these are copper/bronze celts or flat axes, with long slightly expanding shafts, expanding curved bits and, usually, simple butts; these objects may be extremely long in proportion to width. Such flat axes are reported from Umm an-Nar (Frifelt 1975: 365, Fig. 46), Tell Abraq (Potts, this volume), 'Asima (Personal communication Vogt 1989), Ras al Junayz 2 (Cleuziou and Tosi 1989a), Maysar 1 (Fig. 6.3), and Maysar 4 (Fig. 61-2) in southeast Arabia; all but Maysar 4 and Asima are habitation sites, and all but the latter derive from 3rd millennium contexts. A variant of the flat ax, here fairly squat in proportion and extremely thin, occurs in the Shimal six burial (Fig. 29.6:5-6); these objects are compared to metal types at Lothal, Hansi and Rawari (deCardi 1988: 53). In the central Gulf similar flat axes occur more rarely, being reported from Diraz (Fig. 29.6:4) and the Barbar temple (Heskel n.d.). On axes from both these sites are incised marks that are reminiscent of the markings found on the tangs of second millennium points in southeast Arabia. Although not all this material is conclusively Harappan in form (see, for example, the large inventory from Susa, where comparable forms merge into non-Harappan types;

Tallon 1987 with *comparata*), their relative frequency in southeast Arabia and their formal similarity with the Indus corpus suggests that these tools in southeast Arabia were imported or derived from the Indus (cf. Potts this volume).

Copper/bronze tanged knives with curved blades from terminal 3rd millennium contexts at RH 10 at Qurum (*East and West* 32: 228, unillustrated) and from early second millennium contexts at Shimal Burial SH99 (Vogt and Franke-Vogt 1987: 53, Fig. 36.1) also have Harappan parallels. These two objects are dissimilar from each other.

A final metal object may be mentioned here. The copper mirror with anthropomorphic handle from Temple III at Barbar (Glob 1954: 152, Fig. 6) had drawn comment (e.g. Nagaraja Rao 1970, Potts 1983) for its seeming similarities with the mirror at Mehi as well as those more numerous examples in Bactria and adjacent portions of central Asia. While grossly in the same genre, the Barbar figure is executed in a very different style, and is attached to the mirror by its feet rather than by its head as in the Mehi and Central Asian examples.

Stone Weights

One of the most salient classes of objects with an Indus connection found in the Danish excavations at the Qala'at Bahrain was a series of cubic and spheroid weights that conform in metrology and form to the Indus series (Bibby 1967: 92, 1971, 1986); these finds occurred in the latest levels of City I (levels 23-22) and the earliest levels of City II (levels 21 19) in the north wall sounding. This weight system differs significantly in metrology from southern Mesopotamian systems, an observation which Bibby (1971) and others (Roaf 1982, Powell 1983, Zaccagnini 1986) relate to the distinction made in Isin-Larsa texts between the Dilmun and Mesopotamian standards. This difference gained added significance with publication of the Ebla archives, where a 'Dilmun shekel' has common currency. The same cubic weights have been reported from an early second millennium burial at Shimal (de Cardi 1988, Fig. 14.22), the 3rd millennium settlement at Tell Abraq (Potts, this volume), Ur (Ratnagar 1981: 186), and Susa (Amiet 1986: 143, Fig. 93), though none have so far been recovered at Failaka (Tosi 1989, personal communication). Weisgerber (1980: 82), suggests that a spherical stone weighing 7050 grams at Maysar 1 also belongs to this series, while a series of roughly cubic stones at this site betrays a different unit weight (Weisgerber 1980: 85).

Formally and metrologically these weights are undeniably Harappan, since they are based on a unit weight of 1.7 grams, fall into the sequence documented on Harappan sites, and are either cubical or spherical as are the Indus weights. In other aspects, however, the Gulf weights deviate from Harappan patterns. While chert is used for some of the Qala' weights, far more occur in 'steatite' and in limestone, marble and other rock; within the Indus almost all the weights are of chert. In the Qala' series, four of seven weights are spherical, including an example at 13.9 grams as well as higher values (171-1370 gr); this proportion of spherical weights is far higher than normally found in the Indus, especially in the lower range of weight values. While the latter circumstances may reflect a functional specificity (e.g. administering activity at the city gate), these indications severally do suggest a possible extra-Indus manufacture of some or many of the Gulf weights. The recent discovery of a workshop at an-Nasseriya on Bahrain, where banded chert was used to make weights, shows local production of at least some of these weights in the central Gulf (Tosi 1989, personal communication). Thus while the weight system does demonstrate adoption of a Harappan instrument of administration and commercial regulation, the individual weights do not themselves necessarily imply a direct Indus contact during the chronological context of their use.

Beads

Etched Carnelian

Only small numbers of this typical South Asian technology are reported from southeast Arabia, in third millennium burials at Umm an-Nar (Reade's [1979] type B1, Frifelt 1975: 57), Hili (Reade's type B8, Tomb B, Cleuziou and Vogt 1985: 285), and Hili North Tomb A (two beads, Reade's types D8 and D10 [the latter being black on white]; Vogt 1985: 33, Fig. 28.4-5) and Tomb B (five beads; cf. Vogt 1985a: 174), and in the early second millennium burial at Qattarah (cf. Vogt 1985a: 173). In the central Gulf such beads also occur in tombs, though in fewer numbers, at Sar el Jisr (Ibrahim 1982: 36) and Dhahran (as a surface find, Potts *et al.* 1978: 9); During-Caspers (1982: 367) mentions the existence of "a considerable number" of additional etched beads in excavated burials on Bahrain, but these are not yet published. Far more instances are known for Ur, Susa and other third millennium sites in Mesopotamia and the Iranian plateau (cf. During-Caspers 1972, Reade 1979, Chabarakti and Moghadam 1977, Amiet 1986: 143-44, etc.). While etched carnelian beads were certainly produced in, and were typical of, the greater Indus, this region need not have monopolized this technology, as Reade (1979 24.25) points out. In particular, Reade's type B1, an example of which was found at Umm an-Nar, does not seem to be an Indus product. Moreover, given the wide distribution of these beads across the Iranian plateau, Indus products need not necessarily have reached the Gulf directly from Harappan workshops.

Segmented Faience

These beads have a similarly wide distribution in southeastern and eastern Arabia, being reported from early third millennium graves at Hafit (grave 1317, Frifelt 1975a: 61) and Tawi Silaim (cairns 2 and 3, de Cardi *et al.* 1982: 76, bead type m), from mid-third millennium graves at Falaj al Qaba (Frifelt 1975: 375) in southeast Arabia,[5] and from later graves in the Dhahran tumulus field (Zarins *et al.* 1984: 37) in the central Gulf. A segmented bead in silver is reported from the late third millennium Hili North Tomb A (Cleuziou and Vogt 1985: Fig. 5.4). Although this technology and bead form is typical of the Indus civilization, similar beads also are widespread in Syria and northern Mesopotamia throughout the third millennium. While some commentators prefer to find in the Arabian segmented faience beads evidence for contact with the Indus (e.g. Frifelt 1975: 375; Berthoud and Cleuziou 1983: 243), others prefer to look to the northwest for their origin (e.g. de Cardi *et al.* 1982: 83), largely on chronological grounds. This issue cannot be resolved on present evidence.

Miscellaneous Forms

Only a very few other beads with possible Indus connection are reported from the Gulf. At RJ-2 are reported a barrel bead of carnelian and a squat ribbed bead of frit; the latter in particular has specific parallels to materials at Mohenjodaro, Chanhudaro and elsewhere (Cleuziou and Tosi 1989a). In the central Gulf less certainly Harappan are the long biconical carnelian and long cylindrical lapis beads from the Barbar Temple (Glob 1954: 152; Cleuziou 1989, nr 54-55). While usually regarded as a typical Harappan product (e.g. Chabrabarti 1982), the form may nonetheless be fairly general in the greater Indus.

Soft Stone Vessels

The known distribution of the three pertinent Bronze Age styles of carved soft stone (steatite, chlorite, etc.) vessels provide some links through the region. The mid-third millennium *serie ancienne* is represented by single pieces in an Umm an-Nar burial (cf. Cleuziou 1978-79: 43) and at Mohenjodaro (Mackay 1938: 321, pl CXLII.45) and the Dasht River valley near Sutkagendor (Durrani 1964 pl I.6), but by far greater numbers at Ur, Susa, Failaka, Tarut, and Tepe Yahya IVB and Malyan (see the recent review of Lamberg-Karlovsky 1988). The circulation of these materials from production centers (e.g. Yahya, Tarut) thus includes both southeast Arabia and the Indus but barely so. The late third millennium *serie recente,* with known production centers of Miroschedji's (1973) group C in southeast Arabia (Weisgerber 1981: 211-12), is also found at Mohenjodaro (cf. Cleuziou and Tosi 1989: 40-41, Fig. 12) as well as on Bahrain, Tarut, the Saudi mainland, Failaka, Bandar Bushir, Tepe Yahya, southern Mesopotamia and Susa, etc. (see the reviews in Miroschedji 1973, Potts in press, Zarins 1989: 82:83). The early second millennium *serie tardive* of southeast Arabia, on the other hand, seems absent from the Indus but is again present in smaller numbers through the Gulf (again see Potts in press, Zarins 1989: 82-83).

Lastly, a small unguent bottle with round neck and square body, and decorated with dotted circles, occurs in Hili North Tomb A (cf. Vogt 1985: 32, Fig. 28.11-12). This form has a very wide distribution across the Iranian plateau and central Asia, and reflects a trans-Gulf contact with this wide region in the late third millennium (cf. Amiet 1977: 98-99).

Raw Materials

Raw materials provide the final body of evidence for social intercourse through the Gulf. The significance of these materials to the present endeavor rests in two circumstances: (a) the natural distribution of sources, and (b) the patterns of transshipment as reported in the cuneiform literature. In most instances, the relevant materials that survive in the archaeological record, i.e. exclusive of timber, textiles, most foodstuffs, etc., do not occur naturally within the Indus proper, but rather at most were transshipped through Harappan hands; lapis and tin are salient possible examples. Since these same materials usually achieved a wide circulation, especially on the Iranian plateau, their appearance in the Gulf does not necessarily refer to a Harappan connection, as is sometimes explicitly argued—these materials are fluid and insubstantial foundations on which to erect an edifice of Indus trade.

Semi-precious Stones

Carnelian and lapis lazuli objects, usually beads, are commonly encountered throughout eastern and southeastern Arabia, especially the former. Carnelian beads are present in nearly every excavated third millennium mortuary context that contains personal ornaments throughout the region, and carnelian also occurs in many habitation sites of this date; these occurrences need not be catalogued *in extenso*. Lapis, on the other hand, occurs more rarely, being reported as beads from graves at Umm an-Nar (Frifelt 1975: 364) and Hili (grave M, Cleuziou n.d.) in southeastern Arabia, and in the Sar el Jisr (Ibrahim 1982: 36), Dhahran (Zarins *et al.* 1984: 39) and Abqaiq (Piesinger 1983: 138, Fig. 178.2-3, 176.1) tumulus fields in the central Gulf. The stone also occurs in other contexts in the central Gulf, in the Barbar Temple (II) as long cylindrical beads and a lingam (Glob 1954: 152, Mortensen 1971: 394), at Tell Ramadh as beads (a surface find, Piesinger 1983: 1139), and at Rufayah on Tarut as a small figurine of E.D. II style (Golding 1974: 26, Fig. 4.11) and as worked and unworked chunks (Zarins 1978: 66, 67; Piesinger 1983: 1140-42; the contextual status of the Rufayah finds are uncertain, as many looted burials existed here, though the latter report pertains to a sounding that apparently exposed no graves).

The usefulness of these two stones as markers of Indus contact is dubious in both cases. Although sometimes taken as conclusively indicative of Indian contact (e.g. Bibby 1986: 114), Chalcedonies do occur as outwash pebbles in Seistan and the Gurgan on the Iranian plateau, in various regions of Afghanistan, and in southeast Arabia itself (see Tosi 1980 for a review of these sources).[6] Thus while an Indian origin of this raw material in Gulf sites is certainly possible, other sources should also be considered. The natural distribution of lapis is far more restricted, most notably the mines of Badakhshan. The material need not, however, pass through the Indus on its way to the Gulf, and is just as likely to have crossed the plateau (cf. Tosi 1974).[7] Indeed, the two non-bead objects from the central Gulf suggest traffic from both directions, the Barbar lingam pointing toward the Indus and the Tarut figurine toward Mesopotamia. As both objects were probably exchanged as finished goods, however, this evidence says nothing of exchange in unfinished lapis.

A third stone, turquoise, may also be mentioned here. Three beads of this stone are reported from the Qala'at al Bahrain City I (Bibby 1970: 182; these beads are later said to number five and possibly to be turquoise-colored faience, Bibby 1986: 111). Turquoise occurs most prominently in the Kyzyl Kum, but also exists more widely in eastern and southern Iran, and could have passed along the same routes as lapis and other plateau materials (cf. Tosi 1974a), thus also holding no necessary implication of Indus contact.

Ivory

Another exotic raw material is ivory, artifacts of which are reported in the central Gulf from graves on Bahrain (a series of carved boxes, figurines, and a section of tusk; Mackay 1929, Cornwall 1943, Reade and Burleigh 1978, Frifelt 1986) and at Dhahran (several rods; Zarins *et al.* 1984: 36), and in habitation sites at the Qala'at al Bahrain (a sawn tusk from level 14 at the north city wall; Bibby 1957: 158) and the Barbar Temple II (several decorated fragments; Mortensen 1971: 394). The only ivory reported from southeast Arabia occurs at RJ-2, where a comb with dotted circles as well has a polished point have recently been discovered (Cleuziou and Tosi 1986, 1989a), and in the Shimal burial SH99 where a polished object possibly of ivory is reported (Vogt and Franke-Vogt 1987: 54). Several of these pieces have greater Harappan connections, notably the RJ-2 comb and possibly a figurine from 'Ali on Bahrain (however, see During-Caspers 1989 for caution on this chronological and stylistic attribution, though her Minoan-Mycenaean argument holds little plausibility), but for the most part they are stylistically undistinctive. The sawn tusk indicates importation of ivory as a raw material, which presumably was then used to produce the distinctive funerary materials on Bahrain. The source of this ivory is most probably the Indian subcontinent, though other origins cannot be discounted—that is, Syrian via southern Mesopotamia or even East Africa.

Tin

Tin bronzes are rare in Gulf metal inventories. Such objects are occasionally documented at Umm an-Nar, where local alloying is evident (Berthoud *et al.* 1982; 50) and at Hili (Berthoud and Cleuziou 1983: 244), but are otherwise absent from southeast Arabia until the Iron Age (cf. Hauptmann 1987). In the central Gulf, a handful of objects (including a shaft hole axe and the mirror handle) from the Barbar Temple II contain 5-10 percent tin (Heskel n.d.). Traffic in tin via the Indus and through the Gulf is usually argued on the strength of the Gudea inscription that describes copper (?), tin, carnelian and lapis brought from Meluhha, and the pairing of tin and Meluhha copper in an Ur III economic text, while the composition Enki and the World Order also implies a Meluhhan source of tin (see Pettinato 1972, Heimpel 1987 for citation of the cuneiform sources); the composition ur. sag. me. sar. ur$_4$ *sinnamsubba* of Ninurta mentions Magan as a source of both tin and copper (cf. Cohen 1975).[8] The usual interpretation placed on these textual allusions and archaeological occurrences is transshipment of Central Asian tin via the Indus and through the Gulf (thus Muhly 1973: 307, Neumann 1979: 63); such transshipment of tin is an exchange structure perhaps already implicit in the AN.NA *dilmun* of the Ebla archive (Waetzholdt 1981: 366-67; cf. Pettinato 1983: 77). Given the still uncertain sources of tin in Bronze Age western Asia, and the Iranian connections enjoyed by both southeast Arabia and, to a lesser degree, the central and upper Gulf, this interpretation is certainly possible but not proven—a multiplicity of access routes is perhaps more likely.

Copper

Several commentators suggest multiple sources of Harappan copper, used in the Harappan heartland: the Khetri belt (see Chakrabarti 1987), and at Lothal Arabian metal (Rao 1985: 524; Asthana 1982: 277). The latter suggestion is based on high nickel content of analyzed objects at Lothal and the appearance there of a bun-shaped ingot. Such ingots are certainly characteristic of third millennium copper production in Oman, as revealed by the Deutsches Bergbau-Museum at Maysar 1 (Hauptmann 1985), but they achieve a very wide distribution (e.g. at the Barbar Temple [Heskel n.d., Cleuziou 1989 nr 48] and the Qala'at al Bahrain [cf. Ratnagar 1981: 91], as well as Mohenjodaro, Chanhudaro, Lothal, Ur, Susa, Shahr-i Sokhta, etc.; cf. Tallon 1987: 195-96), and refer simply to a basic technology of copper extraction. Thus the presence of southeast Arabian copper in the Indus region remains unproven.[9]

Precious Metals

A relatively small number of object in precious metals are reported in the Gulf. In southeast Arabia gold beads occur in third millennium burials at Tawi Silaim (de Cardi *et al.* 1982: 77) and at Samad (de Cardi *et al.* 1976: 156), and a gold band is known from Umm an-Nar (Salman 1975: i). Gold repousse ornaments occur in an early second millennium burial at Quttarah (Cleuziou 1981: 289) and gold beads in the somewhat later burial SH 102 at Shimal (Vogt and Franke-Vogt 1987: 32), where also occurs gold mountings in burials SH 102 and SH 99 (Vogt and Franke-Vogt 1987: 54). In eastern Arabia gold occurs as a band below Barbar Temple I (Glob 1955:191) and as sheet metal in the Barbar Temple II (Mortensen 1971: 394), while a quatrifoil spiral bead is reported from a tomb near 'Ali on Bahrain (Frifelt 1986: 127; Cleuziou 1989; see Huot *et al.* 1980 for a review of this bead form in western Asia). Silver objects of similar types also occur in many of these same contexts, and need not be reviewed here.

Leaving aside sources in the Arabian shield, gold may have derived from any number of Indian, Iranian, or Central Asian sources (cf. Asthana 1982: 275); silver sources are known for Rajasthan, Afghanistan and parts of Iran. In cuneiform literary compositions gold is associated with Meluhha as well as with other places such as Harali and Tukris, while silver is connected with Dilmun as well as with Meluhha (see Pettinato 1972 for citations); gold and silver are also listed in the early Isin-Larsa period temple tithes in connection with the Dilmun trade (but see Heimpel 1987: 54 for reservations on the latter point). Several commentators see lapis, tin and perhaps gold as related commodities, moving together from proximate sources in Afghanistan and tending jointly to appear in and disappear from the archaeological record of consuming regions as exotic goods (e.g. Berthoud *et al.* 1982: 49; Stech and Piggott 1986: 47, 56-58); the chronological distribution of these materials in the Gulf suggest that the picture is more complicated for this zone of transit trade, though the evidence in hand is still very meager.

Shell

Kenoyer (1984: 60) has suggested that *Fasciolaria trapezium* and *Lambis truncata sebae* may have been brought from the Arabian coast of the Gulf of Oman to supply the massive Indus shell industry. In this connection the finds of *Fasciolaria trapezium* stockpiled in room II at RJ-2, with its massive Harappan connection, may be significant. However, both species that Kenoyer singles out are available in north Indian waters, leaving the issue undecided.

Bitumen

Asphalt occurs regularly in coastal sites of the Gulf, variably used on the interior of ceramic vessels (e.g. at RH5; Cleuziou and Tosi 1989: 28-30), as coating on the basketry common in central Gulf burials (e.g. Ibrahim 1982: 34-35) and at Umm an-Nar (cf. Weisgerber 1984 n.2), in architectural features (e.g. at the Barbar Temple; Glob 1955: 191), as a sealing (e.g. in the Qala'at al Bahrain City II; Bibby 1965: 147), of as slabs (e.g. at RJ-2, argued here to be caulking of reed boats; Bacquart and Cleuziou 1988). Asphalt sources are known in the Makran, coastal Kerman, and on Qishm (cf. Prickett 1985: 361-62), while minor sources also exist at several points on the southern side of the Gulf (on Bahrain, Pilgrim 1915: 2217; in Kuwait, Milton 1967: F7), and also in the interior of southeast Arabia (cf. Cleuziou and Tosi 1989 n.11), to say nothing of the well-known seeps on the fringes of Zagros range to the north. Until analytic work has sorted out the situation in the Gulf, the provenience of archaeological asphalt cannot be determined, and the represented sources must provisionally be assumed to be multiple.[10]

Biotic Forms

Two biotic forms are also relevant here, the zebu (*Bos indicus*) and sorghum (*Sorghum bicolor*). Zebu bones appear in southeast Arabia as a minor form, insecurely identified (e.g. at Umm an-Nar, Hoch 1979: 615). Further, the animal is occasionally represented on painted pottery (Thorvildsen 1963 fig 23 lower), on glyptics (e.g. the triangular prismatic seal from Maysar 1, and also several of the older series of Gulf seals), and on rock art (e.g. Clarke 1975 pl. 4) though the latter is not closely datable (the tomb reliefs at Umm an-Nar and Hili, on the other hand, show only unhumped cattle, thus Glob 1960 fig. 4). Weisgerber (1984: 199) takes the appearance of this animal as indicative of interaction with the Indus. However, zebu seems present in regions on the northern side of the Gulf by the early fifth millennium, as in the early levels of Tepe Yahya and at Daulatabad R37 where faunal assemblages indicate the presence of both *Bos indicus* and *Bos taurus* (Meadow 1985: 108-11, 122-24). Thus in light of the extensive cultural community and exchange relations across the Gulf that existed by the third millennium, the presence of zebu in southeast Arabia bears no necessary implication of a direct Indian connection.

The second biotic form, sorghum, is suggestive of ecological relations in the contrary direction, from southern Arabia to South Asia. Work in the past decade has revealed sorghum possibly as early as the fifth millennium BC at Qurum (RH-5, Nisbet 1985) and certainly throughout the sequence at Hili 8, i.e. from late fourth to terminal third millennium B.C. (Cleuziou and Constantini 1980). Similarly early occurrences of sorghum are now being reported from the Yemen, where the grain appear in terminal third millennium contexts at site WYi (Constantini 1984). These finds are as early as any reported for eastern Africa (e.g. Kadero), the presumed area of domestication of the grain. By contrast the earliest sorghum from the greater Indus is at Pirak, in initial second millennium contexts (see the reviews of Possehl 1987, Meadow 1989). Archaeobotanical study of the Indus is still not far advanced, so this chronological picture may be overturned by future work, but present evidence indicates a possible Arabian role in the ecological transformation of northern India at the beginning of the 2nd millennium B.C..

CONCLUSIONS

This study of Harappan contacts with the Gulf is intended principally as a review of evidence, and as a prelude to a regional culture history; the task of assigning historical meaning to the catalogue here assembled lies outside the present objective.

Nonetheless several preliminary observations in this direction serve as a useful conclusion to the review. These observations are of two sorts: reorganization of the evidence for Indus-Gulf connections into a time-space framework, and postulation of the social processes and historical dynamics represented by the evidence. These two aspects will be addressed in turn.

The greater part of these materials occur in later third millennium B.C. contexts. Looking first at southeast Arabia, almost all the Harappan-connected materials occur in late 3rd millennium contexts. The excavated finds from RJ-2, Ghanadha 1, Maysar 1, and Hili 8 period IIf all belong to the last few centuries of the 3rd millennium; according to the ceramic sequence at Hili 8, this date also coordinates most of the other surface materials. The settlement at Umm an-Nar begins somewhat earlier, judging by sealing evocative of the E.B. IV Syrian style (Amiet 1986: 173-74, but a late third millennium date for the Harappan-related items at the site remains possible. The burials at Hafit and Tawi Silaim belong to the early part of the third millennium. Only a small proportion of materials may be assigned an early second millennium date, at Shimal 6, the Shimal settlement, Qattarah, and Hili 8 period III.

In the Central Gulf, by contrast, the greater part of the material belongs to the early second millennium or, at earliest, the final century of the third millennium, depending on the chronology of the Qala'at al Bahrain sequence and its correlation with the Barbar Temple sequence and with various burial fields on Bahrain and the Saudi mainland. The Failaka evidence also belongs to the early second millenniun. On the Saudi mainland the evidence tends to be somewhat older. The Tell Ramadh settlement belongs to the early to mid-third millennium, as apparently do most of the Tarut materials, though the latter usually lack firm contexts. These order localities, however, provide relatively little pertinent information.

In further analyzing this time-space distributional pattern, several additional distinctions are useful. First, the distinction between Harappan and peripheral materials must be made, i.e. between Harappan pottery, seals, beads, ivory work, inscriptions, etc. on the one hand, and black-on-red and painted or incised grey wares, more broadly diffused metal, bead and other forms, various raw materials, etc. on the other. The latter categories of evidence are both widespread and long-lasting, with distributions that extend throughout the Gulf and southeast Arabia, and cover most of the third millennium. Specifically Harappan materials, on the other hand, seem restricted to the late third and initial second millennium. In spatial distribution both groups of materials occur throughout eastern and southeastern Arabia, but do vary in their representation. Pottery connections, whether Harappan or borderlands, are concentrated in southeast Arabia, with lesser amounts spread through the central and upper Gulf. In contrast, the glyptics, weights, raw materials, and other miscellaneous objects show the reverse distribution. In particular, finds of lapis, ivory and tin are relatively more frequent in the central Gulf than in southeast Arabia. This picture probably will change radically with expanded work on the littoral of the lower Gulf (as at Tell Abraq), but is less likely to change for the interior of southeast Arabia.

A second fundamental distinction to be made lies in inferred modality of interaction. Here assessment of inferential ambiguity is vital to proposed models of interaction. At least two salient modalities are apparent in the materials reviewed in the present paper, namely acculturation or emulation, and spheres of exchange.

In the first regard, the evidence for Harappan contacts with the central Gulf is predominantly found in Gulf seals and the weight system, the first of which probably and the second of which certainly are best seen as Harappan-derived. This evidence points to profound interaction with the Indus at some earlier time, an interaction that may not have endured into the second millennium, when specifically Harappan materials are rare in the central Gulf. In any case, both the weight system and the glyptics are instruments of administration, suitable to the administration of trade; here the concentration within the Qala'at al Bahrain of both seals and weights at the north city wall gate complex (cf. Bibby 1970: 350-55) is significant. Some commentators, and especially During-Caspers (e.g. 1979: 66, 1983: 667), suggest that the Indus inscribed first series of round stamp seals was applied to the control of Harappan merchandise in the Gulf trade, perhaps by linguistically non-Harappan individuals (cf. Brunswig *et al.* 1983). These several observations define both the nature of the prior Harappan presence in the Gulf and the mechanism by which emulation operated in the central Gulf.

In southeast Arabia the issue of emulation is also present, specifically in the production of formally and stylistically Harappan pottery on local fabrics (e.g. at Hili 8, Maysar I, and perhaps RJ-2 and HD-1) and in the incorporation of Harappan design elements in the painted decoration of funerary pottery, especially at Hili. In this instance, however, emulation occurs in the context of an ongoing interaction which introduced a relatively large amount of Harappan materials into the contexts of the emulation itself. Similarly, within southeast Arabia the evidence for direct Harappan contact tends to occur on or near the coast, while interior sites for more frequently exhibit acculturative borrowings of Harappan material cultural than direct contact with the Indus, as seen at Maysar 1. This littoral setting is, of course, exactly that of the emulatory aspects of Arabia-Indus interactions in the central Gulf.

By far the greater proportion of evidence refers, however, to a mechanism other than emulation, namely exchange relations, which are most visible in the wide distribution of black-slipped red ware jars and perhaps also reflected in the various special goods (flat metal axes, beads) from mortuary contexts. Wright's analytic study of southeast Iranian style fine wares in southeast Arabia demonstrates both local production in the wider vernacular and also exchange, here represented in the special social context of mortuary practice. Both aspects appear also to have operated with respect to the Indus, but now in a presumably more commercial vein, where exchange was more pronounced than local production and where local production represents the emulation of an alien cultural complex rather than the operation of a stylistic *oikumene.*

These time-space distribution patterns represent material manifestations of major facets of the Bronze Age Gulf trade, and of the sociological forces that accompanied that trade. The regional archaeological record suggests the early importance of southern Mesopotamia, whether in the central Gulf or in southeast Arabia, particularly during the Early Dynastic. According to the archaeological evidence, these northern connections ruptured in southeast Arabia and greatly attenuated in the central Gulf early in the third quarter of the third millennium, shortly after which Harappan activity in southeast Arabia and inferentially in the central Gulf becomes documentable. Seen through the lens of the cuneiform textual evidence, the history of the Gulf trade traces the success of Dilmun, the central Gulf, in maintaining itself as entrepot to Mesopotamia, i.e. in acting as intermediary with Magan and Meluhha. Dilmun in fact kept this position through the Bronze Age with exception only of the three centuries at the end of the 3rd millennium, correlated with the outward imperial pressures and military activities on the Iranian plateau of the Akkadian and Ur III states, when the textual evidence indicate direct interaction with Magan and Meluhha. The flowering of Bronze Age settlement in southeast Arabia can be related to intensive copper production to supply this trade. In the same way, the shift of demographic and presumably political center in the central Gulf from the Saudi littoral to Bahrain (cf. Potts 1983a) can be related to the entrepot status of Dilmun. Here Mesopotamian influence in pottery and other cultural materials becomes deeper through the second millennium, an interaction not present in southeast Arabia.

The kinds of goods reported in the cuneiform texts and seen in the archaeological evidence just reviewed indicate the importance of Meluhha/Harappa to the Gulf trading system. The precise nature and history of this Harappan involvement in the trade, however, remains elusive. The time-space distributional patterns elicited here point out the fundamental role of the Indus in structuring the trade, and also suggest the historical complexity of Indian participation in the trade. Some aspects of structure and history are already apparent, as seen in the discussion of distribution patterns, emulation and exchange offered above. Many fundamental questions remain unresolved, specifically having to do with the nature, scale and social situation of commerce between the Indus and the various societies of eastern Arabia, and with the historical conditions and consequences of the trade.

As with many examples in western Asia of exchange between urban agrarian societies and smaller scale less complex societies, the Indus-Arabian interaction involved marked disparities in both the kinds of material flows and in the presumptive sociological location of exchange. The former aspect can be seen in the relative infrequency of finished Arabian commodities (e.g. carved chlorite vessels, pottery) found in the greater Indus relative to the numbers of Harappan products observed in eastern Arabia. The same observation applies to pottery as containers of exchanged goods as well, with the abundant representation in southeast Arabia of the Harappan black-slipped red ware jars finding no counter-examples in the inverse context.[11] And finally, the kinds of emulation seen in eastern Arabia, whether of Harappan administrative devices or of pottery forms and decorative style, lack a corresponding phenomenon in the Indus. This kind of asymmetry, though here less pronounced, is also characteristic of Mesopotamian-Arabian interactions throughout the Bronze Age. In both cases, this sort of asymmetry should be understood as the more powerful and multivalent actions of center on periphery, even in the face of mutual interest in, and dependence on, exchange.

NOTES

[1] I wish to acknowledge a number of people for sharing information and lending encouragement in the composition of this review; in no particular order other than alphabetical, these include Serge Cleuziou, Beatrice de Cardi, Karen Frifelt, Flemming Hojlund, Ricard Meadow, Sophie Méry, Daniel Potts, Maurizio Tosi, Burchardt Vogt, and Gerd Weisgerber. I also especially wish to thank Gregory Possehl for giving me the opportunity to undertake the project. Naturally, all mistakes, omissions or stupidities belong to the author.

[2] Additional Harappan material is also present in the Failaka record—M. Tosi and M. Vidale recovered several probable Harappan red ware sherds with dark slip from the surface between the Failaka sites F.3 and F.6 (personal communication, Tosi 1989).

[3] Animals as painted motifs on pottery are extremely rare in Bronze Age assemblages from the Gulf, being restricted to a small subset of the black-on-red and painted gray wares; local traditions of painted pottery are virtually devoid of animal depictions. This circumstances lent the initial identification as Kulli of the Umm an-Nar burial materials, an identification which must be rejected on purely stylistic grounds (cf. Possehl 1986: 18).

[4] The presence of this stylistic sphere across the lower Gulf is central to the suggestion that the cuneiform toponym Magan refers to both sides of the Straits of Hormuz (e.g. Potts 1986), a possibility reinforced by other archaeological materials and cuneiform source (cf.. Heimpel 1982, 1987).

[5] The first two of these contexts fall within the 'Hafit horizon', which is usually given a Jemdet Nasr date in Mesopotamian terms. Recently Potts (1986a) cogently urges an extension of this dating to include the E.D. II or even E.D. III time ranges. All three of the faience segmented beads from southeast Arabia thus potentially belong to the same horizon in the first half of the third millennium.

[6] The carnelian source at Bandar Bushehr that sometimes appears in the literature (e.g. Tosi 1980, Whitehouse 1975) may in fact represent an extensive bead manufacture based on imported carnelian (Prickett 1986: 391) and may not constitute a Gulf source of this stone.

[7] Gulf interaction with the Iranian plateau is still ill-defined. Such contacts are indicated by the Gulf seal and a handful of Umm an-Nar period sherds at Tepe Yahya (Potts i.p.), a few Kaftari painted sherds on Failaka (Hojlund 1986: 100, Fig. 432-434), the vessels with snake-headed plastic ridges or with undulating plastic cordon decoration, found at Umm an-Nar, Hili, Bat, Maysar 1/Samad 5 etc. in southeast Arabia, as well as the Qala'at al Bahrain in its early levels, which find parallels at Tepe Yahya, as well as the distribution of *série récente* carved stone vessels, the unguent bottle at Hili North, Tomb A, etc. While this evidence does show the existence of these contacts, it is too slender and ill-defined to support any sustained analysis.

[8] Access to tin from the southeast is also suggested by tin shipments from Lagash to Adab during the E.D. III (Lambert 1953: 58-59), while traffic in tin at Ur is relatively common (cf. Neumann 1979: 47 n.247). In no case, however, need this movement of tin within Mesopotamia reflect a maritime traffic, since at least in the early second millennium tin appears to have moved

overland across the Iranian plateau through Susa and Eshnunna to Mari and further west (Dossin 1970), and seemingly also from north to south within Mesopotamia (Leemans 1968: 201-210).

[9] Cleuziou and Tosi (1989: 42) suggest that copper traffic in northwest India responded to tensions and destabilization in the Borderlands toward the end of the third millennium, when maritime access to metal sources may have been more effective than overland in the Borderlands, thus promoting engagement with southeast Arabia for this purpose.

[10] Dilmun asphalt, *esir-e-tilmun!-naki*, appears in cuneiform texts (cf. Edzard 1962: 261), at least superficially suggesting a Gulf traffic in this substance. Given the mythical and ideological resonances of the toponym, however, this conclusion does not automatically follow, since the name may refer to a quality or variety of asphalt (compare with e.g. *asnû*, Dilmun dates, or even the Dilmun shekel at Ebla; see Michalowski 1988 on the ideological meaning of literary toponyms).

[11] Dales (1979: 265-66, Fig. 11) draws attention to a vessel discovered at Balakot, for which he suggests a comparison with a vessel from Umm an-Nar (Thorvildsen 1963 Fig. 21 upper left); he therefore considers the jar an import of possible southeast Arabian derivation. Dales' claim stands as the only one for southeast Arabian pottery in the Harappan zone. However, the cited parallel is itself imprecise, and as Cleuziou has pointed out (1984: 391) the decorative style of the Balakot vessel does not fit comfortably in a southeast Arabian context but does in a Baluchistan one. This lack of Arabian pottery in the Indus contracts with presence (though still minimal) of such pottery in Iranian settings, e.g. the southeast Arabian painted orange ware at Tepe Yahya IV (cf. Cleuziou and Tosi 1989: 40) or the Barbar pottery at Bandar Bushehr (cf. Potts 1981 n.21).

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MAURIZIO TOSI

30. The Harappan Civilization beyond The Indian Subcontinent

IN a rare coincidence during the 1920s Ur and Mohenjodaro were being excavated at the same time, under the leadership of two equally talented British archaeologists, Leonard Woolley and John Marshall, who were to be knighted for their successful enterprises. Also, for the first time the English-speaking public could follow the progress of those ongoing large-scale excavations from a number of lively reports published on a popular weekly magazine, the *Illustrated London News*. These first-hand descriptions conveyed an intriguing image of the Bronze-age civilizations that preceded in southwestern Asia the age of Biblical prophets of over a millennium. Anyway, the contemporary excavations at Ur (1922-34) and Mohenjodaro (1921-31) should not be remembered just for the excitement they aroused, but much more for having provided the archaeologists with sufficient new material to study the culture of those early urban societies on a much broader cognitive base. In this sense both excavations still overshadow the present research work, commanding aspects of our historical speculations. The publication of both enterprises, promptly undertaken only a few years after the fieldwork had ended (Marshall 1931; Woolley 1934), granted to the archaeology of ancient Near East the dignity of a self-standing discipline, breaking the tight bonds with those Biblical studies that had justified the first involvement of European institutions in the 19th century.

More than Just an Archaeological Question

It was Mohenjodaro that provided the major turning point in the studies of the Asian Bronze Age. By proving the existence of an advanced Bronze-Age urban society beyond the Iranian plateau and far to the east of the Fertile Crescent, that vast brick ruin of Sind made the emergence of urbanism a historical problem of much wider implications. At this point it became critical to establish the kind of relation connecting the Indus with the Near East during the third millennium B.C.

To what extent the Indus Civilization can be treated as an original phenomenon of pristine urban development is still very much an open controversy. The question is not just a petty academic one, but it is relevant to establish whether the investments in people and resources the Indus Civilization would deserve should compare with those directed in the past to the study of ancient Mesopotamia and, more recently, pre-Columbian Mesoamerica. An archaeological record can tackle complex historical phenomena only when the amount of data collected is large and differentiated enough, to account for the variability present within a complex social system, spreading like the Indus Civilization over greater space and time. Undoubtedly, these data will only be available if those investments are made, supporting a number of multidisciplinary long-term projects. Like a dog biting its tail we are trapped in some sort of dead circle. As long as these new data are not made available to scientific inquiry, most historical speculation will remain subjected to the vagaries of accidental discoveries and preconceived biases.

Earlier explanations for the emergence of the

Indus Civilization have ranged between very distant extremes: from the direct colonization of Mesopotamians in the early fourth millennium B.C. dear to Sumerologist S.N. Kramer to the partonogenetical mode of birth in total seclusion, professed by most scholars in India.

For a vast majority of ancient Near Eastern specialists the Indus Civilization is largely regarded as a late epiphenomenon of the paramount Mesopotamian experience. The emergence of complex state societies across Southwest Asia would be in a more or less direct way the consequence of a motion originated in the alluvial lowlands of the Euphrates, Tigris and Karun during the fourth millennium B.C. However conceptually readjusted in more recent years, the Mesopotamo-centric perspective is very much alive today. On the other hand there is at present no good reason to dismiss it, particularly after the spectacular discoveries that from 1969 on have highlighted the great expansion of the Late Uruk-Jemdet Nasr cultural complex outside Mesopotamia. The foundation of entirely new settlements, like Habuba Khabira on the Syrian Euphrates, and the eastward diffusion of Jemdet Nasr ceramics a few generations later into the Oman peninsula have proven in both directions the expansion capacity the lowland early states had reached by the end of the third millennium B.C. Assuming that such widespread changes could not have occurred without profound disruptions of preceding sociopolitical realities, one can expect that the shock waves also reached Baluchistan's eastern fringes, along the Indus Valley western margins. Regret one has to conclude that until moretably direct data becomes available, archaeologists will not be able to use more sophisticated conceptual frames to unfold the relation between cultural contact and social evolution.

For those standing on the opposite end, claiming independent origins for an Indus Civilization viewed as already Indian in the spirit, the issue is further complicated by ideological factors. The British Empire was already a crumbling political entity at the time that Marshall was digging Mohenjodaro, but some of its Victorian ideology of European mastership was still alive. One of its corollaries was that the immense human universe of the Indian subcontinent had to be considered a single historical entity that the morally-superior British civil servants were called to restore to its original splendor. The discovery of Mohenjodaro in the twilight period of the British rule would quite appropriately serve the scope by conveying an image of common ancestry for many of India's historical characters. Those profound internal diversities frozen in the caste system, would then be explained with the disruptions of the mythical Aryan invasions and the impossible amalgam between the victors and the vanquished. This perfect construction would save at once, two necessary political postulates, otherwise radically opposed: the unity of the Subcontinent and the hegemony of a minority. Efforts were made by several leading authorities to emphasize continuity between Bronze -Age India and the Hindu traditions, while archaeological explorations were to be focussed on uncovering the local roots of the Indus Civilization in the plains of Sind and Punjab. The best example is a long essay, published by a prominent Indian scholar, Ramaprashad Chanda director of the Calcutta Museum, in as early as 1929 in the major official series of the Archaeological Survey of India, with the title *Survival of the Prehistorical Civilisation of the Indus Valley*. This was written while the Mohenjodaro excavations were still open.

Unfortunately for this scheme, the economic depression following the collapse of the American stock market in 1929, was particularly devastating in such marginal areas of the capitalist system as the colonial dependances throughout the world. Very few funds were available for archaeological activities in India during the thirties. While excavations could still benefit from the cheap manpower, there was no money for specialists and technical support. Although the Archaeological Survey of India became revitalized in the very last years of the British Empire for the efforts of its last director before partition, Sir Mortimer Wheeler, the data made available could only minimally enlarge the original picture. Aimed to equip the Indus Civilization with a more solid chronological skeleton through accurate stratigraphical seriations, Wheeler's strategy remained one of quality, while his basic assumption was that local development of the Indus Civilization had to be assumed until otherwise proven. The quintessential scientist, Wheeler remained throughout his life a man of immense curiosity, loyal to the facts and always ready to accept what new explorations brought to light. The problem was that there were few facts, since the Indus Civilization was for many years in a vacuum. Till the late sixties very little was known of the prehistory of the lands to east of Mesopotamia, even if they included countries of great importance to the later history of Asia, such as Iran, Turkestan, Baluchistan and Arabia.

One might not have expected that a broader understanding of the Indus Civilization and its role in the history of mankind would emerge from new research in these intermediary regions. The pattern of contacts and exchange that the Harappans established with Mesopotamia and these other countries is a subject that touches the heart of the issue concerning the historical role of their civilization. Spread from the Arabian sea to the Himalaya, the Indus Civilization was the largest continuous cultural system of Bronze-age Asia, aggregating hundreds of thousands of people within its political and social institutions. To assume that its influence was strictly confined to the Subcontinent as a birthplace of the Indian Civilization, is too simplistic and too reductive a perspective. One important target for future research would be to reconstruct the contributions it received from and gave to the countries across the mountains and the ocean bordering India to the west and to the south. Anyway, the available data through the scatter of finds outside the Subcontinent may already convey us an image to widespread involvement, both in Arabia and Central Asia. By reviewing this evidence, this paper attempts to suggest that the relations of the Indus *Civilization* with these foreign countries might have had a far greater impact than ever expected. (Fig.30.1)

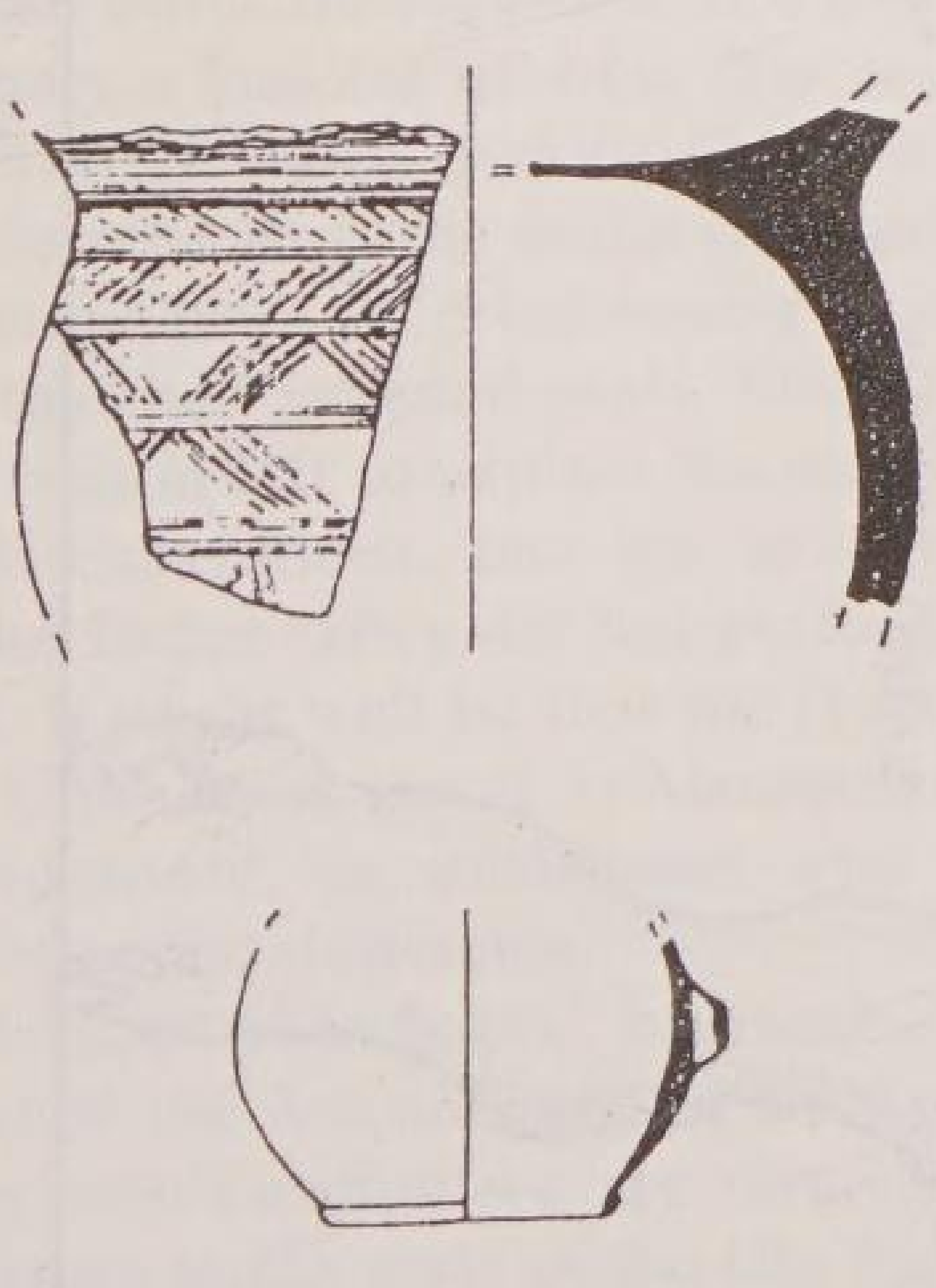
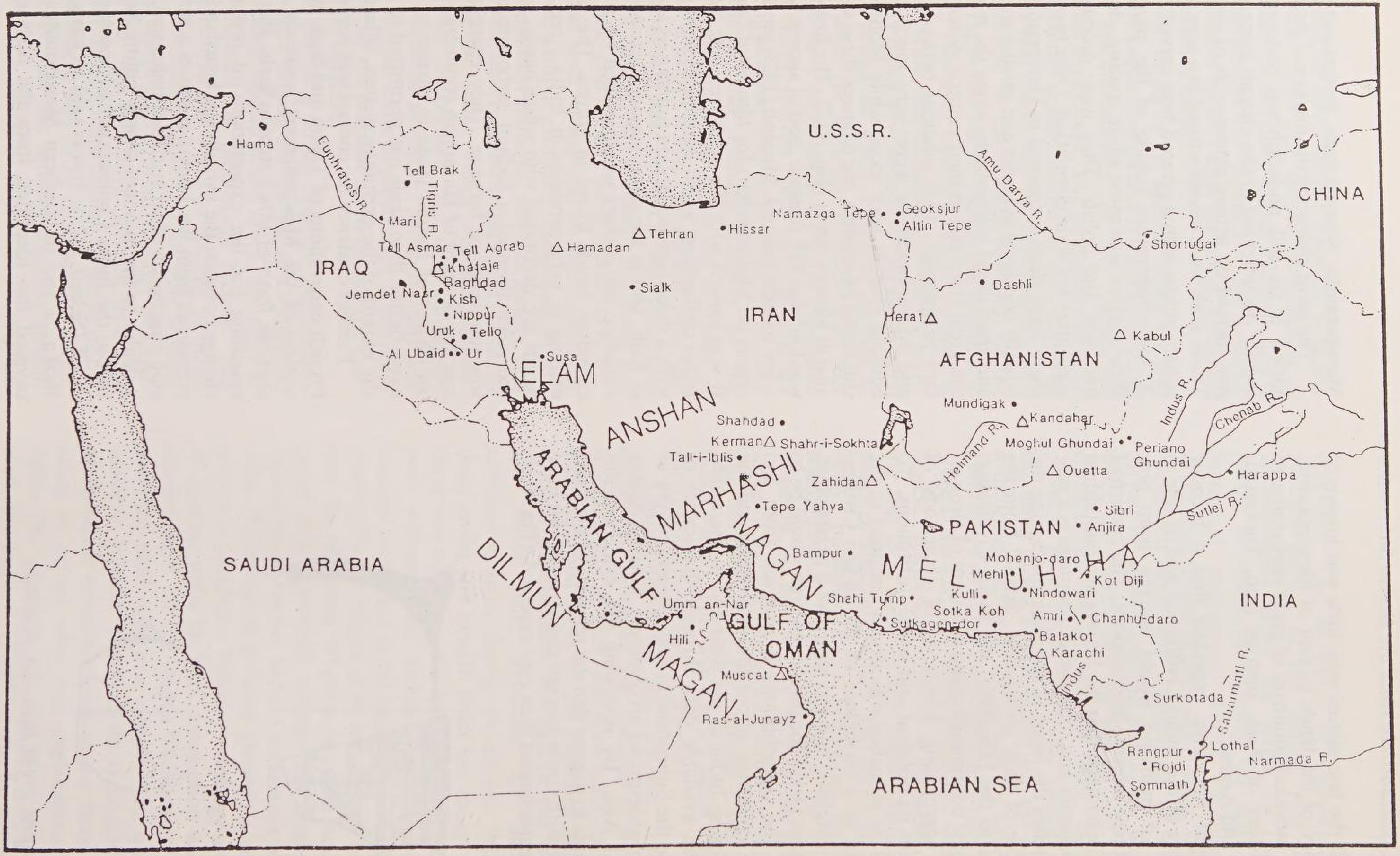


Fig. 30.1. Chlorite vessels from Mehi.

Mesopotamia: Strayed Seals, Scripts and Beads

The most characteristic marker of the Indus Civilization is its still undeciphered pictographic script, mostly documented in the elegant epigraphic form it was incised on square stamp seals of glazed steatite. These seals were manufactured in a very standardized square shape with a pierced boss carved on the back. A low-temperature baking of the steatite vitrified their surface to a snow white coating, that increased hardness and polish. They were produced in large quantities for wide circulation. Over two thousand of them have been recovered in Harappan settlements, equally occurring in larger and smaller sites, in houses and specialized compounds, along the mainstream of the great river and in their cultural system's most distant peripheries. That relations between Harappans and Mesopotamians were very much of a reality became evident very soon, while Mohenjodaro was still being excavated, the moment these seals surfaced also in Mesopotamia (Fig. 30.2). The first one of them was found at Tell Ahaimir, part of ancient Kish, in 1923, a few months before J. Marshall (1924) produced his first report on Mohenjodaro for *Illustrated London News*. It was carved with the most frequent motive of the Indus civilization: a bull standing in front of a manger with a three sign inscription running on top of it. Also at Kish, and in the same season of excavations, more evidence for contact was provided by a few etched carnelian beads found in graves. The technique of etching is very common in India : red chalcedony beads are decorated with white bands, produced by the calcination of a sodium carbonate coating in a low-temperature furnace. They represent another tracing element of Harappan connection, as well as an object of Indian trade in historical times, that even better than seals has permitted to reconstruct the extent of the exchange system. (Plate 30.1)

Further evidence for contact was recovered by the French excavations of Telloh and Susa, major urban centers of the Mesopotamian lowlands, in the perceptible form of other steatite seals. But even more revealing for the expectations of contact and exchange between the two alluvial heartlands, there was recovered from the Louvre reserves a well-preserved clay impression of an inscribed Indus seal, brought by a dealer to the museum shortly before World War 1, before the Indus Civilization had become recognized at all (Scheil 1925). It was said to have come from Jhoka, a site in southern Mesopotamia still unexcavated but identified from the texts collected by


U.S.S.R.
CHINA
Hama
Euphrates R.
Tell Brak
Tigris R.
Mari
Tell Asmar
Tell Agrab
Khafaje
Baghdad
IRAQ
Jemdet Nasr
Kish
Nippur
Uruk
Tello
Al Ubaid
Ur
Susa
ELAM
Hamadan
Tehran
Hissar
Sialk
IRAN
Namazga Tepe
Geoksjur
Altin Tepe
Amu Darya R.
Shortugai
Dashli
Herat
Kabul
AFGHANISTAN
Mundigak
Kandahar
Indus R.
Chenab R.
Helmand R.
Moghul Ghundai
Periano Ghundai
Quetta
Harappa
ANSHAN
Shahdad
Kerman
Shahr-i-Sokhta
Tall-i-Iblis
MARHASHI
Zahidan
Tepe Yahya
Sibri
Anjira
Sutlej R.
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Bampur
MAGAN
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Mohenjo-daro
Mehi
Kot Diji
Nindowari
Kulli
Shahi Tump
Sotka Koh
Sutkagendor
Amri
Chanhu-daro
Balakot
Karachi
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DILMUN
Umm an-Nar
Hili
GULF OF OMAN
MAGAN
Muscat
Ras-al-Junayz
Surkotada
Sabarmati R.
Rangpur
Rojdi
Somnath
Lothal
Narmada R.
ARABIAN SEA

Fig. 2: Map of the Near and Middle East and the Indian Subcontient.

looters with the ancient Sumerian city of Umma. The provenance has never been confirmed and never will, but there is no reason to doubt that it came from southern Iraq, where those dealers operated. The impression bears the usual "bull and manger" motive with a 6-sign inscription running on top (Fig. 30.3). In 1931 the sealing was donated by the Louvre to the Ashmolean Museum of Oxford on account of its relevance for the British research in the Indus valley. The seal impression had been carefully centered on the front side, while the back bears a clean impression of a cloth tied on a jar mouth by a string run around the neck. A deeper hole on one side marks the knot the clay lump was covering to seal the jar's content against any illicit manipulation (Fig. 30.4).

Such clay sealings represent for the archaeologist a uniquely direct source of information on such administrative procedures as the control of storage and shipment of merchandises across the Middle East in the 3rd and 2nd millennium B.C. Literally thousands of them have been found across Southwestern Asia, from Nubia to Anatolia and from Syria to Afghanistan. The immediate assumption one could draw from the Umma impression was that it relates to a shipment of expensive goods packed in sealed container. But a less straight forward explanation might be necessary if we consider that his type of sealings, so common in the Middle East, are unknown from the Indus Valley and the countries of the Subcontinent's western borderlands. From Baluchistan, Oman and southern central Asia only a handful of these clay sealings have been recovered. With a ratio between seals and sealings close to 10:1, the Indus civilization is radically different from all other countries in the Middle East that had adopted seals. Since there is no technical reason left to explain the scarcity of sealings in all excavations, one has to conclude that seals in the Indus valley did not perform the same functions. It might well be that the Harappan sealing from Umma was struck in Mesopotamia for an Indian expatriate, in accordance with local formalities for sealed shipments.

That Indian "merchants" had settled in Sumer at the end of the 3rd millennium B.C., undergoing increasing acculturation we are directly informed by the Mesopotamia texts of the late 3rd and early 2nd millennium B.C. Between the time of Sargon of Agade and the end of the IIIrd Dynasty of Ur (ca. 2350-2000 B.C.), they mention a land of Meluhha, as a country located beyond the Persian Gulf that supplies through maritime trade many exotic goods: ivory objects, inlay works, gold, carnelian and other precious stones, hard woods, rare animals and slaves are most prominent in the lists recorded on the tablets. One could hardly argue that Meluhha provide Mesopotamia some access to resources from tropical lands around the Indian Ocean. In a commemorative inscription, Sargon the Great (2334-2279 B.C.) claimed among the main achievements of his rule that the ships of Meluhha together with those of other two countries along the shores of Arabia, Dilmun and Magan, moored at the wharfs of his new capital, Agade.

A cylinder seal of the same period bears the Cuneiform Akkado-Sumerian inscription *su-i-lį-su/* eme-bal me-luh-ha, meaning "Su-ilisu, Meluhha interpreter" (De Clerca 1888) (Plate 30.2). Rather symbolically, Su-ilisu is represented on the same seal as a dwarf seated on the lap of a person of higher rank, possibly the king himself, while addressing two visitors. We may add that about a century later the Meluhhans contributed to the construction of a new temple built at Lagash by the ruler Gudea, carrying "wood and other raw materials" from their distant homeland. Finally, towards the end of the 3rd millennium B.C., while direct trade with Meluhha is fading from textual evidence, a Meluhha village (e-duru me-luh-ha) and Meluhha sons (dumu me-luh-ha) are mentioned in a dozen economic texts of the Ur III dynasty, listing persons and debts or dealing with rations and deliveries of cereals. The Assyriologists have interpreted these texts as witnesses of an acculturation process involving one or more enclaves of aliens from the Indian Subcontinent, progressively integrating into Sumerian society. Relations might not have been always that peaceful, if one considers an earlier text, probably Sargonid, where a Lu-Sunzida, man of Meluhha, "has remitted to Urur, son of Amar-LUKU... 10 shekels of silver as payment for a broken tooth...".

Although few and dispersed, these texts are telling us that communications were active and involved people as much as goods. For the historian the relevant problem is now to establish how these relations effected their social reality. We know that the two civilizations remained substantially different from each other, but how could one argue that the exchange had no effects on their respective

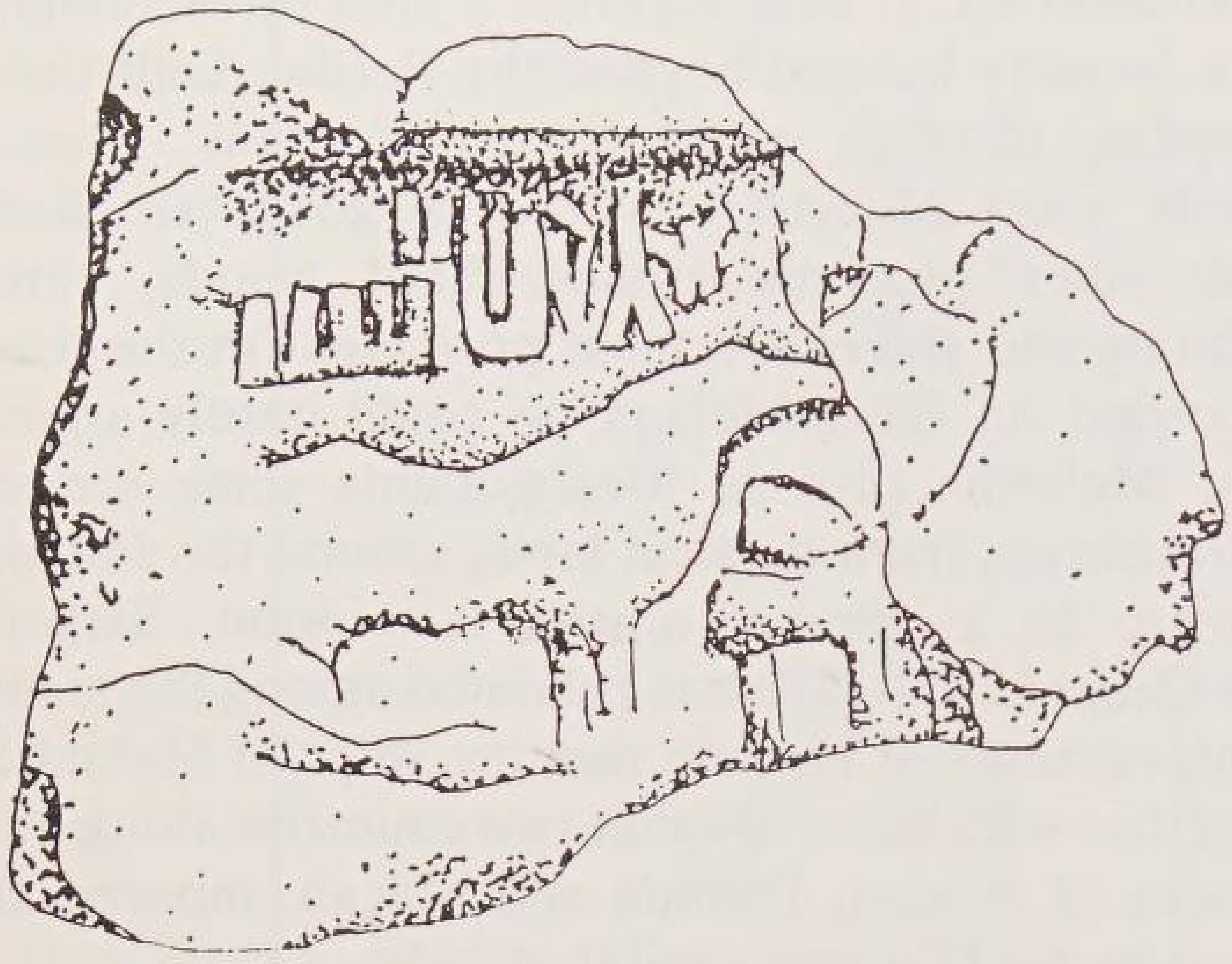

Fig. 30.3. Indus seal impression from Tell Umma(?)

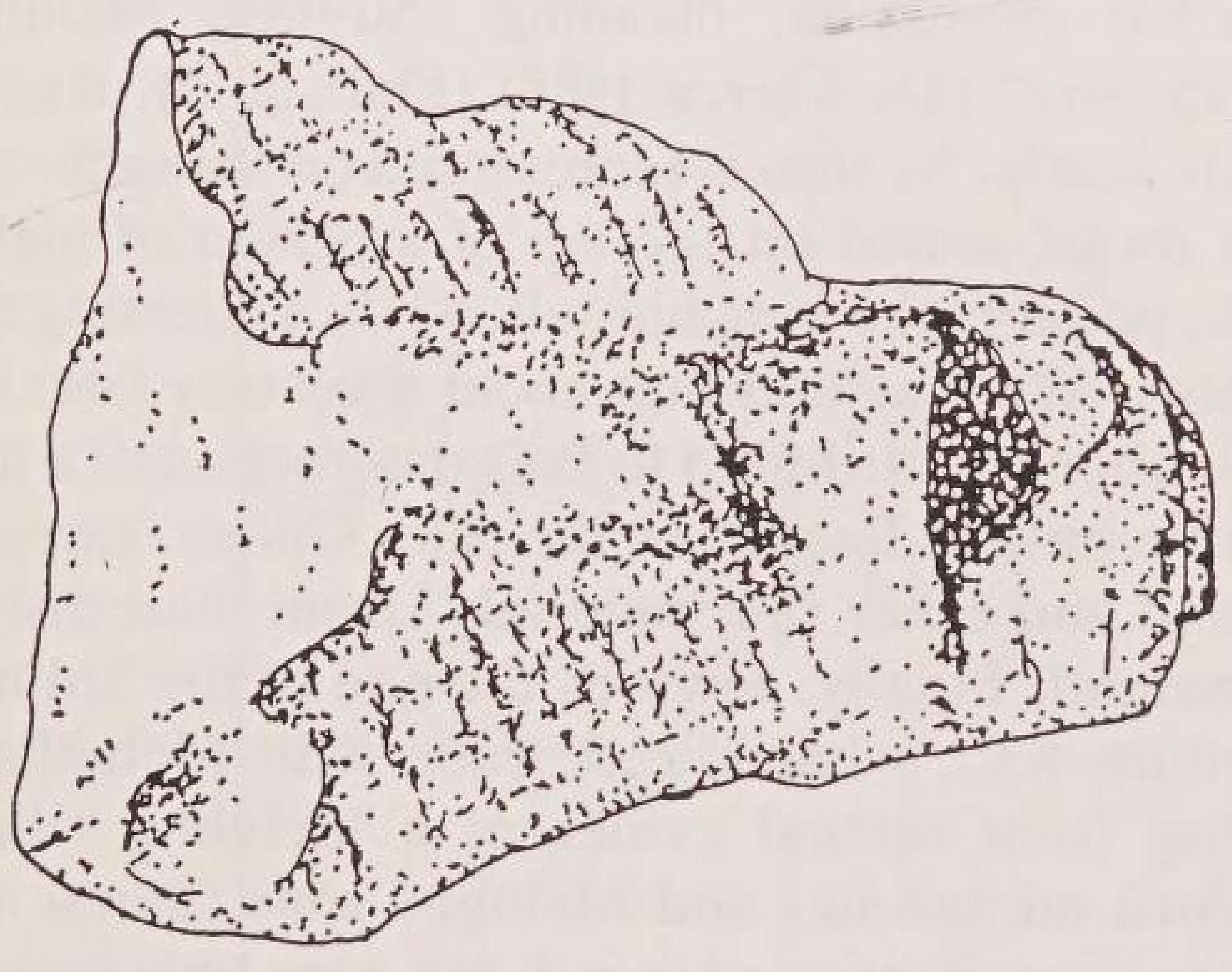

Fig. 30.4. Reverse of Umma(?) seal impression.

evolutionary trends? Furthermore, one should also consider the possible fallout of the long distance trade on the lands in between. Here the transformations determined by the trade systems might have been the most conspicuous. Southern Iran, Baluchistan, the Gulf and the Oman peninsula had to be brought on the stage as active characters before one could even describe the plot.

Anyway, neither chronological nor historical implications could be derived from any of these imports until some of them were recovered in a stratigraphical context. The Oriental Institute of the University of Chicago excavations in the Diyala valley of Iraq during the 1930s (Francfort 1933, 1939, Francfort, et. al., 1932) made this association possible. At Tell Asmar, the ancient Eshnunna, H. Frankfort and his colleagues by came across a number of Harappan imports and were finally able to nail down their range of occurrence between the Akkadian dynasty and the end of the Ur III period, between 2350 and 2000 B.C. These imports included kidney-shaped ivory inlay pieces, etched carnelian beads and potsherds from small knobbed ware jars, a frequent occurrence at Mohenjodaro. None of the typical square steatite seals was found, but a significant piece of connection to the Subcontinent was added by a cyclinder seal, AS.31:22, made of glazed steatite and deeply carved with a procession of three of the most characteristic animals in India's wildlife: an elephant, a rhinoceros and a garial crocodile (Fig.30.5). One could have hardly selected a more exotic and intriguing lot to impress a foreign audience. Cylinder seals are not unknown in the Indus Valley Civilization, since four of them are reported so far, but their style and carving technique remained very distinctive from any of the Mesopotamian productions: to say it in Frankfort's own words "... no Babylonian seal of this quality shows so unbalanced a composition". Furthermore, he assumed that the rendering of physical details in the animals' body was so vivid to leave little doubt on the origin of the artist. While it is conceivable, at least on stylistical grounds, that the seal from Eshnunna had been manufactured by an Indian craftsman, we seem to face here that same combination of formal similarity and functional diversity suggested by the Umma sealing: an object in all effects Indian in character and manufacture, is adjusted to a differing reality. The "Meluhhans" seem to be part of the Mesopotamian world, while still identified by their particular set of symbols and signs, very much alike the image conveyed by the Ur III texts we previously discussed. AS.31:22 was found in a sloping dump, just outside the outer walls of a large late Akkadian household compound, in period IVa of the site sequence, 2300-2200 B.C. in date. Although it is not a primary context of deposition, its consistency with the earlier finds from Kish and Ur indicates at 2200 B.C. a safe quantum limit *post quem non for* the period the Harappan cylinder seal was used at Eshnunna.

Frankfort's stratigraphical specification to the Akkadian period of the Harappan material in Mesopotamia the provided the archaeologists with the first cross dating relation for the Indus Civilization that also agreed with the scanty textual references to Meluhha Later finds and further studies have largely confirmed this line of reasoning

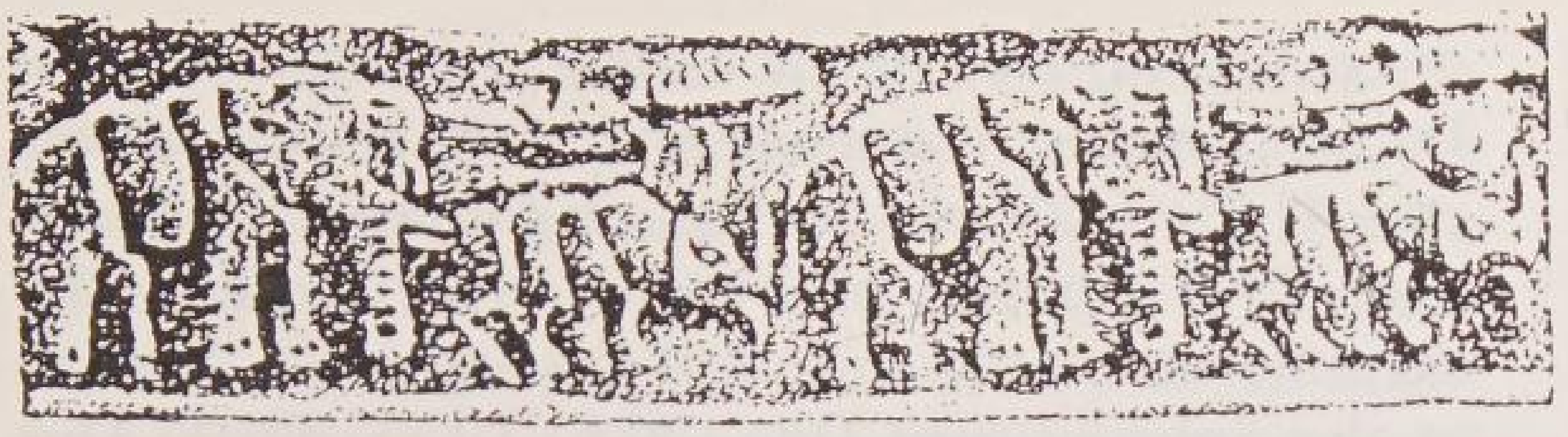

Fig. 30.5. Cylinder seal from Tell Asmar.

For example, the distribution of etched carnelian beads across the graves of the Royal Cemetery of Ur (fig. 1), recently revised by J. Reade of the British Museum, indicates their earlier introduction to Mesopotamia to the end of the Early Dynastic III period, around 2350 B.C., maybe one generation before Sargon of Akhad, established his dominion over the Babylonian lowlands. This is not to say that previously there was no contact or exchange between the ends of the Gulf, but more simply that none of the diagnostic mature Harappan objects reached Mesopotamia before 2400 B.C. To what extent the two aspects are related is still a matter of speculation, that only more excavations in Iraq and Pakistan could ground on more solid feet.

The last of the inscribed Indus seals to surface in Mesopotamia came to light at Nippur in 1977. It is a perfect glazed steatite specimen of the zebu bull type, but it was unfortunately recovered in secondary context from a house of late Kassite times, dated around 1250 B.C.. The steatite is severely worn by prolonged exposure, suggesting a long period of disuse. There is no reason at present to dispute L. Oppenheim first suggestion that Meluhha, and the Indus Civilization, leave the Mesopotamian world at the time of Hammurabi, in the 18th century B.C.

In conclusion, the scenario pieced together from the Mesopotamian archaeological record implies that contact between the two great centers of Bronze-Age civilization was a reality, but neither an intense nor a continuous one. Shortly after 2400 B.C., direct traffic in luxury commodities was activated between lower Mesopotamia and the Indus Civilization, along a maritime route of communication. The lack of Mesopotamian imports in the Indus Valley is quite revealing of a lesser significance of these connection for the eastern pole. Very much alike the Roman trade with India and Arabia as described by the *Periplus of the Erythrean Sea* in the first century of our era, the flow of goods towards the head of the Gulf in the late 3rd millennium B.C. was determined more by the Mesopotamian demand than by degrees of economical integration with the distant lands that supplied those goods from the shores of the Indian Ocean.

Worlds in Between

The Harappan evidence in Mesopotamia was ambiguous from the very beginning. Not only the few true imports exhibited elements that could only be explained in terms of adaptation to local conditions, but some of these early finds related to the Indus Civilization do not match anything known from the Subcontinent. The contemporary excavations of Ur were at the origin of the riddle: sixteen round steatite seals were discovered in different locations of the site, mostly datable to the early centuries of the 3rd millennium B.C. Six of them were engraved with Harappan pictograms running above the usual humped bull and manger composition. While their relation to the world of Mohenjodaro was out of question, the connection was definitely a puzzling one. The critical aspect was not their dissimilarity from the thousands of finely carved square specimens found in the Indus, but their internal morphological consistency as products of a distinctive sphragistic tradition.

Assyriologist C.J. Gadd who published the seals in 1934 was too fine a scholar to take these striking distinctions as irrelevant and he referred to them as *seals of ancient Indian style,* suggesting they were "..... more probably, a product of some place under the influence both of the Indus and the Sumerian civilization". Also, he noticed that among the few pictographic signs there were some unreported in the Mohenjodaro inventory. When in recent years an exhaustive listing of all the Indus Civilization signs and concordances was undertaken by Asko Parpola, the distinctive combinatory aggregation in the Gulf inscriptions was further confirmed on a much wider scale. Nevertheless, how close Gadd was to reality by suspecting the existence of an intermediary entity became clear only twenty years later, at the time a Danish expedition initiated the first systematic prehistoric research in the islands of Bahrain and Failaka, along the Arabian coast of the Gulf. Hundreds of steatite stamp seals of the same round type came to light from coastal settlements of the early second millennium B.C. with the remains of a new Bronze-Age culture. It was the land of Dilmun, a recurrent placename in all kinds of Mesopotamian texts during the third millennium B.C. mentioned as a neighbouring country across the "southern sea", renown for its orchards and seafaring supplier of exotic goods. Woolley's excavations at Ur provided at this point another important connection, through a group of tablets he recovered from houses of the Ur III and Isin-Larsa periods. These were the economic accounts of merchants and investing pools of temple estates and private entrepreneurs involved in the maritime trade with Dilmun, and the further lands of Magan and Meluhha. Copper, ivory, precious stones, ebony are the main commodities listed in the contracts, to be imported against outbound garments, oils and cash payments in silver.

Meluhha is only mentioned in the texts of the Third Dynasty in association with such characteristic Indian imports as ivory or carnelian, while it disappears together with Magan from the Isin-Larsa texts, after 2000 B.C. In 1954 Leo Oppenheim, one of the leading post-WW II Assyriologists, proposed that this change reflected the growth of Dilmun as a trading centre. A privileged partnership with Mesopotamia would have placed the island in a key position to control the flow of goods from the Indian Ocean. Increasingly mediated by this third entity in coastal Arabia, relations between Mesopotamia and the Indus would have decreased, with Dilmun achieving a monopoly in Isin-Larsa times. Between 1954 and 1970 a surprisingly wide body of archaeological evidence could be brought together to support this still very linear proposition of a tripartite merchantile system. The first bit of evidence was implicit in the same Ur excavations, considering that those Isin-Larsa tablets shared the same context of provenance with Gadd's "Indian style" round seals. On another tablet of the same period, from the Yale University collections, and dated to the 10th year of reign by Gungunum of Larsa (1923 B.C.) (Buchanan 1967) the cuneiform text was impressed with a Dilmun seal. A few more Harappan inscriptions carved on Gulf seals like the first Ur specimens were found by the Danes at Failaka, together with several other items of "Indian" origin. Among these, a number of Harappan weights, the characteristic chert cubes were found at Qal'at al-Bahrain, confirmed the sharing of standards, essential to the efficiency of trade performances. Even more impressive was the discovery in 1961-62 of a typical Dilmun seal at Lothal, a mature Harappan settlement at the northern end of the Gulf of Cambay, in Gujarat. Lothal is over 2000 km east of Bahrain, very close to the extreme southern reaches of the Indus Civilization in the Subcontinent (Fig. 30.6) (Rao 1963). This find indicats the extent of the northern seabord of the Indian Ocean that could have been economically and culturally encompassed by maritime trade around 2000 B.C. In archaeological terms evidence for exchange is best based on products travelling in both directions. The seal found at the other extreme of the Arabian Sea was the first import from the west to surface in an Harappan site. Quite curiously, the excavator of Lothal, S.R. Rao, used the Dilmun seal to argue the importance of the site and the Harappans in general in the Bronze-Age seafaring trade, although in strictly logical terms it should be more simply related to the Gulf merchants' activity in Gujarat. It would now be futile to fashion a controversy from this early proposition. In light of later discoveries in Oman and in eastern Iran, the explanation would be on a different, far more entangled, level of historical interpretation.

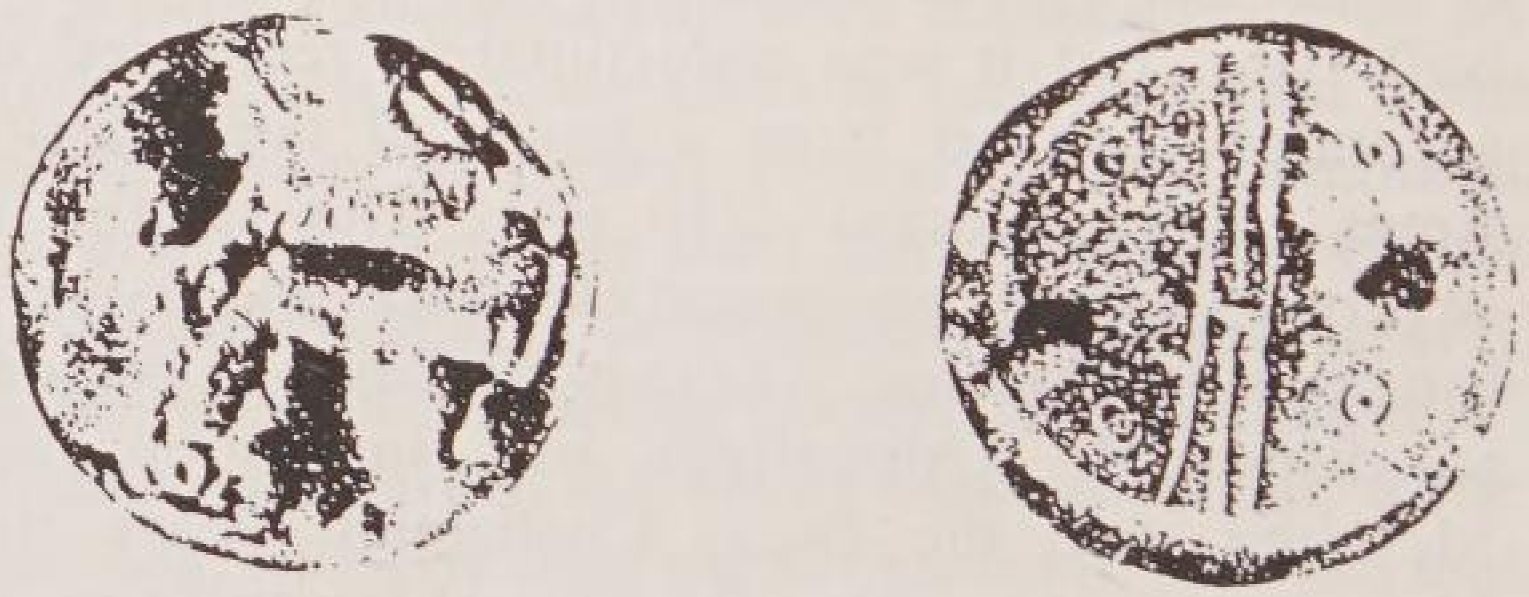

Fig. 30.6. Persian Gulf seal from Lothal.

The search for the maritime aspect of the Indus civilization drove G.F. Dales (1962) to survey in 1960 the long arid coastal stretch of Makran. Two strongly fortified Harappan sites were located at Suktagendor near Gwadar and Sokta Koh near Pasni, some 150 km apart. Surrounded by heavy stone walls both sites required a tremendous effort to be built and supplied. Neither of them lies presently on the waterfront, but some 20-25 km from the coast, on seasonal streams guarding important access routes to more densely inhabitated riverine oases of the interior. More than seaports they recall strongholds to separate the interior from the coast. Since Neolithic times the population in the highlands of southern Baluchistan was scattered in a mosaic of small oases and wide pasturelands, but by the end of the third millennium B.C. in spite of the lack of any urban hegemonism, they had reached a higher level of social integration. While incorporating several elements of Harappan technology, the cultural assemblage remains very distinctive from the Sindi lowlands and retains with stronger affinities to local Chalcolithic traditions. The name of Kulli culture, generally used by the specialists and derived from the first type-site identified, is still little more than a label for a complex of surprising homegeneity across most of Makran (Possehl 1986b). Political unrest made impossible any further research along the western coasts of Pakistan. As a consequence the relations among Kulli, Harappans and Arabians have remained an open question, even difficult to formulate in appropriate terms.

In the late sixties most of the intermediary regions, north and south of the Arabian Sea were still for the archaeologists large unexplored territories. Subsequent explorations and excavations in eastern Iran, Afghanistan, Soviet Central Asia and Oman have filled some of the gaps, opening new perspectives our simple model of linear maritime circulation could not tackle. In general, these researches have disclosed that a whole mosaic of early civilizations had developed across the Iranian Plateau and the riverine basins of southern Central Asia, emerging as historically distinctive entities at the end of the 4th millennium B.C. The easternmost fringes of these cultural aggregates reached beyond the highlands of Baluchistan and were certainly an important factor in the formation of the Indus Civilization. Around 2500 B.C. the main centers in each system presented most of the discriminant urban features-monumental architecture, elite houses and burials, craftsmen quarters and forms of administrative organization. For causes still largely unexplained it was an ephemeral accomplishment. All across this vast territory cities came to an end in few centuries, roughly between 2200 and 2000 B.C., right at the time when the mature Indus Civilization is most directly connected to Mesopotamia. Very little Harappan material has been found so far, all in contexts shortly preceding or following 2000 B.C. An impressed potsherd with a 3 sign inscription comes from Yahya IVA in Southeastern Iran; etched carnelian beads from Hissar IIIC; ivory gamesmen and dice combined with two seals of glazed steatite, one bearing a swastika, the other two pictographic signs, were found at Altyn depe in southern Turkmenia in the locally developed urban context of period NMZ V, datable to the last quarter of the third millennium B.C. (Fig.30.7). If it was for this handful of imported products we would have concluded by presenting a classical case of lowland-highland cultural discontinuity, with all possible implications for conflict. The picture has been confused by unequivocal as unexpected evidence for deep interdigitation between the two areas.

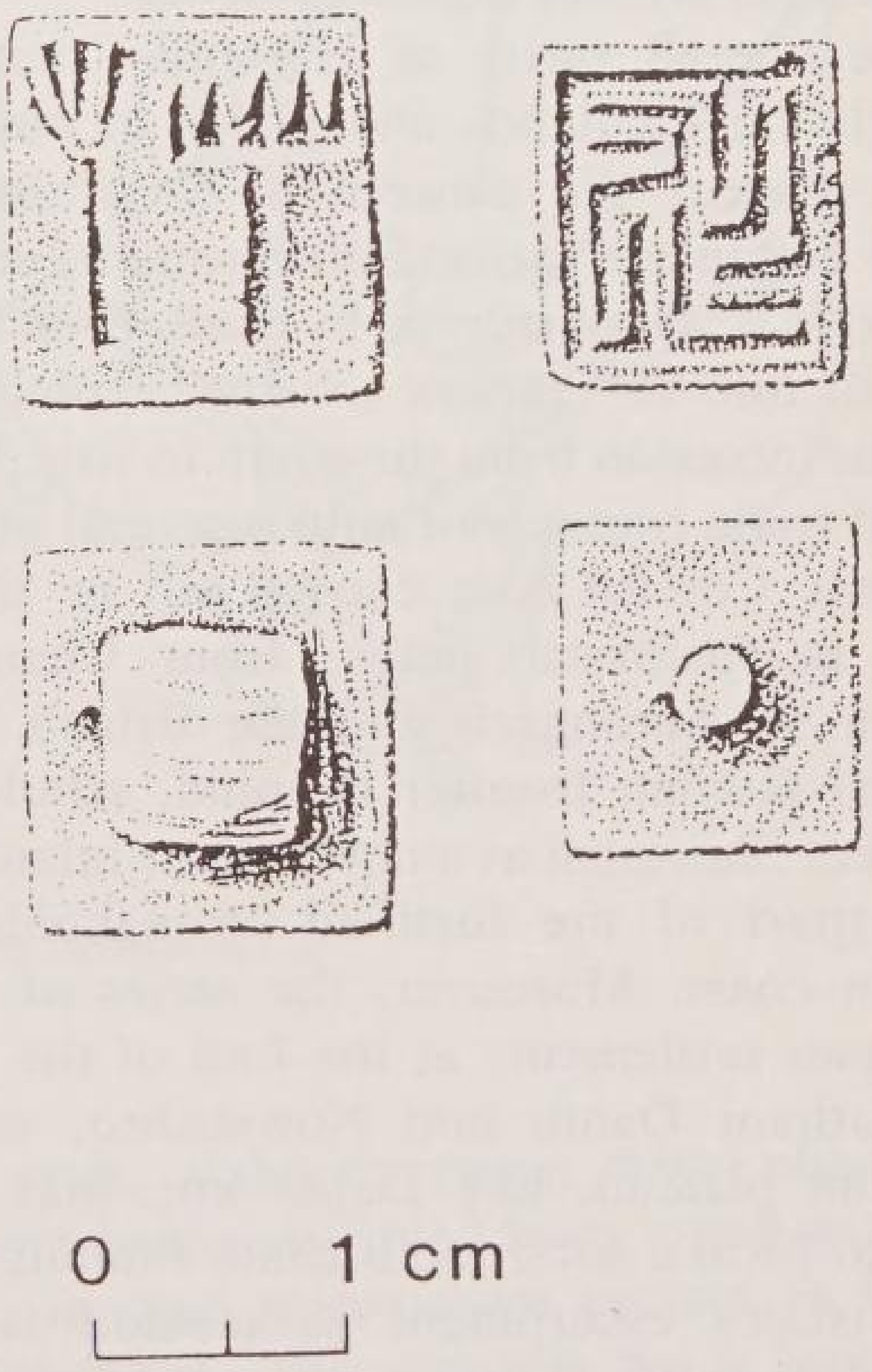

Fig. 30.7. Indus style seals from Altyn Depe.

Already before WW II, explorations in Sind had detected the presence of highland cultures, with distinctive Iranian metaworks, intruding Harappan assemblages across the lower Indus valley as at the type-site of Jhukar, only 30 km NW of Mohenjodaro (Piggott 1946). However, the surprising breakthrough came in 1976 with the discovery by a French expedition of Shortugai, a complete Harappan settlement on a tributary of the Amudar'ja, in Northeastern Afghanistan (Francfort 1989). The site is located on the Kokcha river banks at the foot of the rich Badakshan minerary district. While it is still within an area feasible for farming, Shortugai closely overlooks a bottleneck access to gold, silver, lapis lazuli, copper and lead ores. None of the standard attributes of Harappan complex is missing, including a canonic stamp seal with a carved rhinoceros below the inscription. If the full package of the lowland culture could be dispatched some 1000 km to the north, across Afghanistan, the most plausible explanation would indicate a form of direct colonization to the north of the Hindu Kush. The discovery of Shortugai does not change the fact that impact of the Indus civilization in the Turanian centers of eastern Iran is minimal according to a not insignificant archaeological evidence.

The overall rarity of Harappan materials all through the highlands and plains of eastern Iran might support the concept of a cultural system locked within the Indian Subcontinent, and largely specific to it. If considered by itself, even Shortugai could fit into the narrow scheme, explained as an episodic intrusion from the south to control resources and trade routes, not unlike several attempts to penetrate Central Asia carried out by the Indian rulers in historical times, from Chandragupta Maurya to Aurangzeb and the British. With an imperial Roman frontier in mind, scholars could represent Shortugai as a northern or inland outpost counterpart of the fortified strongholds on the Makran coast. Moreover, the series of imposing Harappan settlements at the foot of the Kirthars, like Pathani Damb and Nowshahro, or on the Suleiman plateau, like Dabar kot, may be combined to form a continuous chain running all along Baluchistan's escarpment to seclude the Indian lowlands from the Arabian sea to the Central Asian steppes. Since the evidence fits so well with a model of distant historical experience, caution should be customary practice.

Oman Discloses the Indian Ocean Perspective

To the south and across the ocean this schematic image of extreme entrenchment is being totally reversed by the emerging information on the Bronze-Age of Oman. Long-delayed by the political isolation of the region, archaeological research has produced in a few years such overwhelming amount of evidence for cúltural contact and economic exchange with the Indus Civilization that one has difficulties explaining the phenomenon in terms of a trade-conquest paradigm. Beginning around 2300 B.C. Omani sites along the coast as well as in the interior oases, incorporate in their inventory a large number of Harappan artefacts, regardless of size, rank or position. Harppan ceramics are found in affluent oases settlements like Hili (Clauzion 1984) and in tiny seasonal camp sites like Ghannada, on the western coastlands halfway between Dubai and Abu Dhabi. The local metallurgy and seal cutting crafts are directly influenced to Harappan techniques, collective burials include among the furnishing frit beads and the ubiquituous etched carnel an ones. Even more revealing of the complexities involved is the ceramic industry, once archaeometrical analyses have looked more in details at the composition and manufacture of the Harappan sherds. S. Mery from the French expedition to the Oman peninsula has proven in fact that a good number of the most typical Harappan wares were manufactured locally from the same clays used to make pottery of Omani tradition. Finally, one should point out that the only Bronze-Age inscription so far recovered in Oman is a group of four pictograms incised on an Harppan sherd (Fig.30.8). It was accidentally found on Christmas Day of 1981, sticking out a site in the sandy embayment of Ra's al-Junayz, 11 km south of Arabia's south-east cornerpoint at Ra'sal-Hadd. The location is important because this area is still the major landmark for the boats crossing from Pakistan to the Gulf and Africa. Between Pasni (Sotka Koh) and Ra's al-Junayz there are some 450 nautical miles, the largest open stretch of ocean waters to cross on the route from India to Yemen and Africa. South of Ra'sal-Junayz it is coastal navigation all the way, regulated by the ocean surf and the monsoon shifting of the winds, running parallel to the southern Arabia shores. Further inspection the surface of the site disclosed more Harappan sherds, amongst local metal and ceramic products with an occupational range between the late third and the early second millennium B.C.

Excavations, initiated in 1985 by a joint Franco-Italian expedition (Cleuzion and Tosi 1986) have uncovered structural remains around the sherd's original findspot. A large carefully planned mud-brick building is coming to light, built it is not

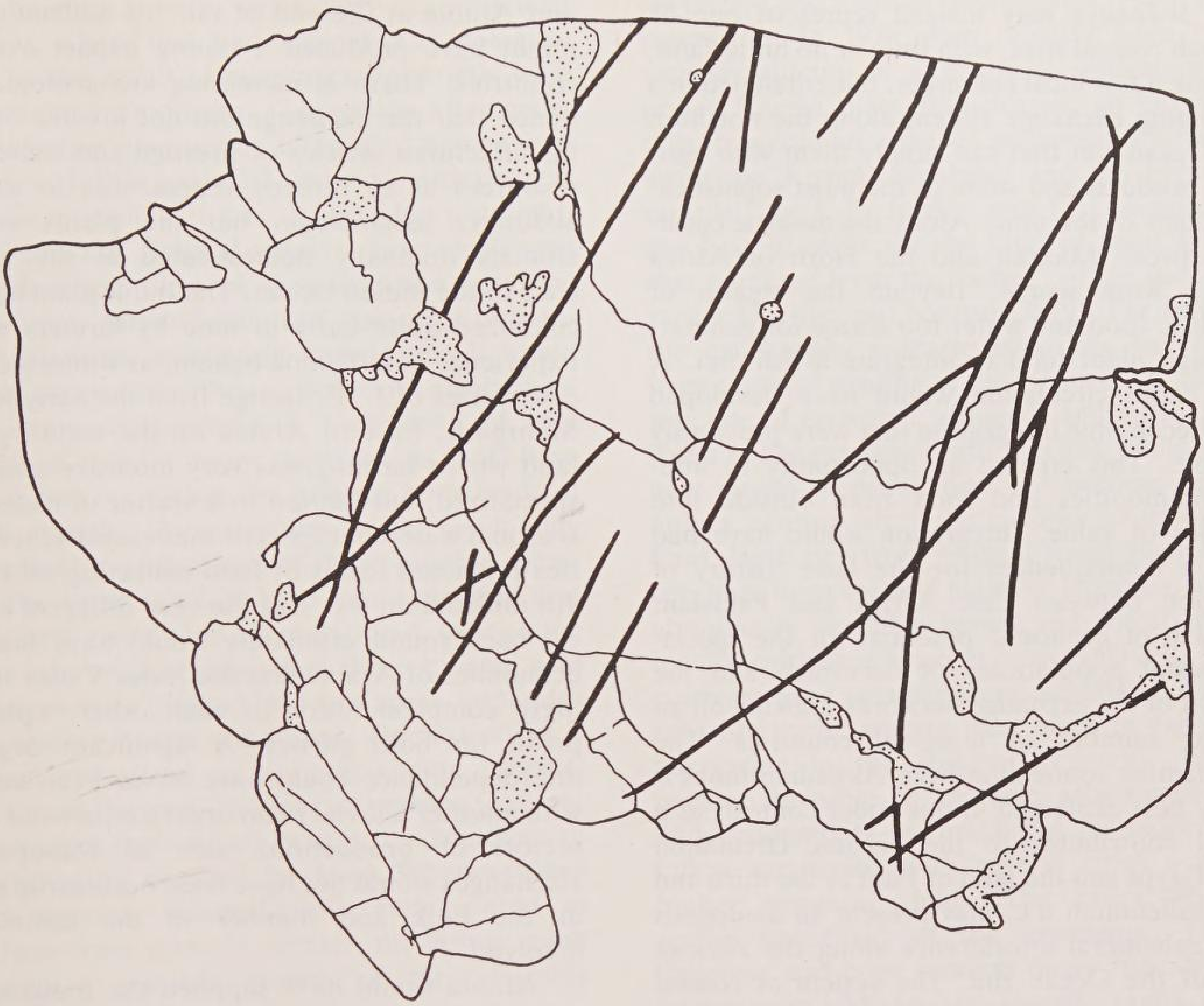

Fig. 30.8. Pot sherd from Ras Al Junayz with Indus script.

earlier than 2300 B.C. A wing of seven identical storerooms runs along the northern side of the complex, each opening on a long corridor room through doors outfitted with stone sills and internal sockets, and connects the building with some specific trading activities. Several stages of occupation are evident, in the last of which the storerooms were used as workshops for the manufacturing of commodities from strictly local resources. Apart from fishes, the direct evidence includes shell rings made from *Conus* and *Pinctata* shells, large conch shells of *Fasciolaria,* turtle carapaces, chert abundant in nearby outcrops and an eye-paint extracted by crushing a magnesium ore, pyrolusite. The associated Harappan imports were collected from a much wider space and represent all kinds of manufactured goods: large pottery jars, copper and steatite seals, alabaster vases, metal objects and, most remarkable, a carved ivory comb with direct parallels in such mainstream centres as Harappa and Kalibangan. The site was not a foreign entreport, supplied from an Indian mainland: objects of Omani production remain the majority of the consumed goods, including 80% of the pottery, the greater part of the metal or stone instrument, the basic fishing technology. Most interestingly, the site does not seem to have been involved in the shipment of copper, the most important Oman commodity, that certainly ranked first in a trade with the metal-poor Indus Valley. With the closest sources of copper ore at some 150-200 kms to the west of the site, one could hardly be convinced that Ra's al-Junayz was a suitable port-of-trade for Oman's centers in the interior.

Ra's al-Junayz may instead represent one of many such coastal sites, with little or no hinterland, processing a few local resources, but entangled in a wide ranging exchange system along the northern Indian Ocean rim that can supply them with agricultural products and some of the most sophisticated products of the time. Along the desertic coastlands between Makran and the Horn of Africa resources were scarce. Beyond the wealth of marine life, food and water too scarce for generating enough plant food to integrate a fish diet. A regular cargo circulation would have developed forms of economic integration that were previously impossible. This created an opportunity to integrate commodities and food from outside into economies of value. Integration would have had two main consequences for the later history of this region between East Africa and Pakistan: the growth of economic potential for the specialized coastal populatioins of fishermen and the expansion of the exchange networks drawing on an increasing number of marginal countries. The Mesopotamian connection from Akkadian times is probably best explained in this wider context, as a marginal contributor to the oceanic circulation system. Egypt and the land of Punt in the third and second millennium B.C. may present an analogous case of ephemeral interference along the African section of the Ocean rim. The system of coastal circulation was a result of a local adaptation process shared by the coastal populations who were increasing control over the ocean beginning the early Holocene as demonstrated by the countless number of small sites on the Arabian coastlands from Kuwait to Yemen. The circumnavigation of the Indian Ocean along its northern rim was probably accomplished by 5000 B.C. and we can hardly believe that such an complex exchange network would have been created by a limited demand for exotic goods in the Mesopotamia, Egypt or the Indus Valley farming economies. The Indus Civilization probably had a major impact and a more active present, partly as a consequence of its geographical proximity, but to some extent also because it had from its beginning a more intense exchange with the Arabians.

A Long Lasting Revolution

In spite of their profound differences, the maritime trade developed between the Indus Valley and Arabia at the end of the 3rd millennium B.C. might have produced a lasting impact over both countries. There is increasing archaeological evidence that the exchange did not involve only few manufactured articles of prestige and some exotic resources as so directly represented in the Ra's al-Junayz assemblage, but the plants and the animals originally domesticated at the extreme ends of the Indian Ocean. The Indus plain had been colonized quite early in time by farmers with an experience of millennia behind, as witnessed by the discoveries of J. -F. Jarrige from the early levels at Mehrgarh. Eastern Arabia on the contrary was a land where farming was very intensive and highly specialized, but limited to a scatter of oases along seasonal watercourses. The main subsistence activities remained forms of food collecting till the late 4th millennium B.C. But the very different ecological background ultimately would have made the economies of Arabia and the Indus Valley increasingly complementary to each other, optimizing profit for both parties. A significant degree of interdependance could have never been achieved with another alluvial plain organized around similar sectors of production, such as Mesopotamia. Exchanges would not have been necessarily smaller in the bulk and number of the commodities involved.

Arabia would have supplied the Indus with its unique domesticates, camels and dates, still so important in the traditional agriculture of Sind and Baluchistan, and pass on the cultivars of African ancestry like the millets including sorghum. These crops had been introduced by 4500 B.C.: a few distinctive charred grains of sorghum have been recovered from fishermen's settlements of this time near Muscat in Oman, associated with domestic ovicaprid and cattle bones also imported from outside the Oman peninsula. By 3000 B.C. this African cultivar was grown with wheat, barley and dates at Hili as part of the multicropping strategy characteristic of oasis farming in eastern Arabia. Although the incomplete palaeobotanical evidence is still, the picture of a Middle Holocence transfer of tropical African cultivars along the northern Indian Ocean seabord would confirm the early imaginative theories of the American geographer Carl O. Sauer (1952) on role of seaborn plant dispersal for the development of primitive agriculture. All domesticated plants were first cultivated in the natural habitat of wild growth, often very circumscribed territories, where they had originated as biological species as the result of adaptation to strictly local environmental conditions. Generation after generation selective pressure by intensified human exploitation will drift genetical variance, with degrees of specific mutation. It was anything but a straightforward process. Several scholars have challenged the gradualistic idea of domestication resulting from a steady intensification of man-plant or man-animal relations, suggesting instead that it would not have happened without a conscious effort and a major energetic investment. *Cultivation* of wild ancestors of today's major staple grains could have gone on forever within the original homelands of natural growth. *Domestication* would result only from radical modifications of those pristine conditions. The same scholars have then suggested that the selective trend towards mutation domestication was set into motion only when the cultivated wild progenitors were planted into new areas, under different environmental conditions. Domestication is then conceptualized as a never-ending process, still active in the present time, as a means to create new resources from nature or adjust old cultivars to an evergrowing demand for food. Whenever two distant regions, independently endeavoured to agriculture have come in contact, the lasting result has been a sensible growth of their farming potentials.

The merging of the Old and New World traditions from the sixteenth to the eighteenth century brought an age of wealth that has made possible the greatest expansion of the human population on earth. A similar revolution was also possible in late prehistoric times, when the African, Indo-Iranian and South-East Asian centers of plant husbandry were connected to the Near East and among themselves by the early maritime trade along the shores of Arabia and India. The Harppan connection with Oman and the eastern Arabia would imply that these mechanisms of integration would have been greatly accellerated. Can we claim any factual evidence of agricultural transformation as resulting from this intensified contact across the ocean? If there is any it would be cast into the palaeobotanical record and some of the available results are very promising. In 1978 plant remains from Pirak, a second millennium agricultural settlement in the upper Kacchi plain Baluchistan, an environmentally transitional zone of piedmont alluvium between the Kirthar highlands and the Indus plain, sampled by J.-F. Jarrige and L. Costantini, gave the first in sight on the kind of rural landscape that emerged from the "ashes" of the Indus Civilization (Jarrige and Santon: 1979). Far from being the catastrophy scenario historians had fictioned from a literal reading of the Vedic epics, the image was one of economic affluence and diversification. None of the previous crafts was lost, while a lot of a new means of production had become customary only a century after the collapse of urban life in Sind. Both rice from tropical South-East Asia and sorghum from the arid plains of Ethiopia, were now abundantly available barley and wheat that were locally cultivated since at least 6000 B.C. The new cultivars were summer crops, scheduled on a different life cycle: sowing took place in early spring, harvesting in the summar (Possehl, 1986a). It became possible to increase subsistence options and productivity by practicing far more efficient fallow strategies, with several crops a year and higher marginal yields. The entire agricultural sector benefitted of the expansion. Terracotta figurines and bone remains prove that camels and horses were added to the domestic fauna, probably as a result of an increased availability of plant food. In turn, these new animals expanded the capacity of farmers for packed transport and rapid communications, limited in Harppan times to bull carts. Multicropping and pack animals transformed the whole economical bases of rural economy, setting the structure of traditional Indian agriculture. By 1500 B.C. Pirak presents us with the image of the Indian village as it will be known to the first Europeans.

The wide ranging contacts and the integrative processes activated by the Indus Civilization in the latter part of the third millennium B.C. were ultimately responsible for a reinvigoration society is more and more evident as our knowledge is enlarged by new archaeological work.

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PART V

THE LATER PHASES OF THE HARAPPAN TRADITION

A. GHOSH

31. Deurbanization of the Harappan Civilization

WHILE many definitions of preindustrial urbanization are available, I am inclined to think that the list of the ten abstract criteria laid down by Childe (1950) still holds good. It is true that the list is "a mixed bag of characteristics" and that all the criteria are not primary ones, some being derived from others (Adams 1966: 45-47); nevertheless, in their practical application they are not devoid of relevance.

Deurbanization of a civilization would involve the reversal of all the criteria. Thus, the settlements, extensive and densely populated, would become smaller with a thinned population. The non-food-producing people such as full-time specialist craftsmen, transport workers, merchants and officials would dwindle in number and the food-producing people would be left with little incentive to produce surplus. Monumental buildings—the symbol of social surplus—would no longer dominate a settlement. The use of a script would be a thing of the past, unless it is adapted by some other urbanized community. Long-distance trade to meet the requirements of specialized craftsmen and to supply luxury goods would not be required, though imports of essential items, prevalent even in Neolithic times, would continue. With all this there would be a fall in the material prosperity of a deurbanized population and the need for central enforcement would be reduced.

As Childe's criteria for urbanization are abstract, so too are the signs of deurbanization and their character varies from civilization to civilization. While applying them to the deurbanized Harappan Civilization, I shall have to say a few words on the character of the urban Harappan to understand the process of Harappan deurbanization. I think Fairservis has unduly emphasized the religious character of the civilization by holding that Mohenjodaro was almost a purely ceremonial center and that trade had not much influence on its location and upkeep (Fairservis 1967: 1-35). While his remarks primarily apply to Mohenjodaro, it is clear from what he says that they are intended to apply to the totality of the civilization, since his main theme is the progressive "Indianization" of the cultures of the Indo-Iranian borderlands. This is a process in which the bull, appearing on the seals and pottery and represented in terracotta, plays a prominent role. I do not think that this hypothesis is plausible. It is now generally accepted that the Harappan seals were used for commercial purposes, viz., to authenticate merchandise. Further, the bull is certainly not the most recurring "field symbol" on the seals. The unicorn, which has no place in later Indian religious belief, heads the list with a frequency of 1159, while the bull, in all its forms, is a poor second, with only 156 (Mahadevan 1977: 793) and it is altogether absent at Lothal (Rao 1973: 139). Ritual bathing, another piece of evidence for Indianization cited by Fairservis can be deduced at Mohenjodaro, and to a lesser extent at Kalibangan, but is absent at other important sites of the civilization such as Harappa and Lothal. It is also difficult to generalize on the form of the Harappan religion: the fire altars of Lothal (Rao 1973: 139) and Kalibangan (Lal 1979: 77) are unreported from Mohenjodaro and Harappa. A uniform set of Harappan religious beliefs and practices is therefore difficult to envisage. Equally so, therefore, is the 'Indianization' of the Indus Cultures. A religion-based Harappan Civilization is far from established, though religion had no doubt its share in the life of the people. In which prehistoric and historical society did it not?

On the other hand, trade seems to be the *leitmotiv* of the Harappan Civilization. The Indus-Mesopotamian trade relations have been extensively discussed in many works on the civilization. The nature of this long-distance trade is now fairly well known and new facets have been added to it by the discoveries at Lothal, as well as the now identified trading centers on the Oxus, in Afghanistan (Gupta 1979: I, 133-220) and on the Makran Coast. The generally accepted identification of Meluhha with the Indus world is also of relevance. This long-distance trade was both direct and indirect (Asthana 1979: 31-43). It is also known that it declined at the end of the Third Dynasty of Ur and virtually stopped with the Isin-Larsa Period, when the Mesopotamians turned to Arabia and Egypt for their commodities (Asthana 1979: 31-43). The cessation of this trade at about 1900 B.C. must have had an adverse effect on the prosperity of the Harappan Civilization and must therefore have been one of the factors leading to the decay of the cities, to the deurbanization of the civilization and to the dispersal of its population.

But perhaps physical variables were more potent in this matter than the loss of trade. Guesses on the cause of the decay of the civilization have been many and need not be recounted here, but it seems certain that each of the different regions had its own particular problems. Desiccation may have been a difficulty at Kalibangan, but too much moisture, waterlogging, may have been a problem for the Sind sites. However, the theory put forward by Raikes (1964) on the presence of a great lake in the Indus Valley formed by tectonic movements has been, to my mind, successfully refuted by Lambrick (1967). Man-made factors, such as the wearing out of the landscape, deforestation and foreign invasions have sometimes been alleged to be the culprits.

It is irrelevant for the present purpose to evaluate the different propositions. It would suffice to point out that in all the regions—Sind, Gujarat and Rajasthan—the catastrophe took place in the early centuries of the second millennium B.C., and it is not insignificant that Harappan foreign trade ceased at about the same time. The people were evidently so overwhelmed by their own troubles that they could no longer pursue the luxury of foreign trade.

Even before the final catastrophes, the civilization was on its decline. A possible reason for this may have been the natural fatigue of an overgrown culture. Thus, the latest levels of Mohenjodaro show a marked decadence and loss of civic control—clear signs of deurbanization. It is only after the final Harappan abandonment of the sites that squatter populations move in. There is the Cemetery H occupation at Harappa and the Jhukar occupation at Chanhudaro. The recent theory that these cultures were continuations and derivations of the Mature Harappan (Possehl 1977) requires further investigation. They will not be called 'late Harappan' in this paper. Lothal Period II and Rangpur Period II B (Period I of Lothal and Period II A of Rangpur being Mature Harappan) show signs of degeneration. There is also a spread of sites into the interior of Saurashtra at this time, and it is interesting to find that the people chose elevated grounds and rocky outcrops to settle upon, as if they had learnt the lesson of the dangers of living on flood plains (Chitalwala 1979: 116). This naturally restricted the size of the settlements.

On the mainland coast of Gujarat, S.A. Sali has discovered some fifty sites in the Tapti Valley of Dhule District. Two of them have only late Harappan material, while the rest have late Harappan mixed with the Savalda and Jorwe Wares (Sali in press). At Hingoni Budrukh, a site in the latter category, a sherd with two Indus characters was found. At the other sites the Red Ware is the only criterion for Harappan occupation. Sali says that this Red Ware has a thicker, sturdier and finer fabric than any other Red Ware in the region and includes typical Harappan shapes such as the dish-on-stand and perforated vase. But the painting consists of only monotonous geometric designs and lacks the varied designs of the 'Indus' and 'provincial' styles. Sali has emphasized the absence of the urban discipline of the Mature Harappa at these sites.

Further south, in the Dogavari Valley, Sali's re-excavation of Daimabad on the Pravara has revealed a late Harappan Culture overlying the Salvada Culture. This is followed successively by the buff-and-cream, Malwa and Jorwe Cultures. The late Harappan occupies a respectable area of about 20 hectares, though this may not entitle it to be called "the capital of the Harappans in this region," for it can be doubted that the decentralized and scattered late Harappan population formed a sufficiently organized society to need a capital. Mud walls give place to mud-brick walls, and an excavated grave is lined with mud-bricks of two sizes, the dimensions of both of which have the ratio of 1:2:4—a continuity of the Harappan tradition. The late Harappan pottery shows a marked degeneration over that of the Tapti Valley, but the painting continues to be monotonous geometric designs. In spite of the occurrence of three Indus signs on the rim-fragment of a pot, the process of deurbanization is complete. I refrain from commenting on the Harappan affinity of the four controversial bronze figures from Daimabad.

What contacts, if any, the Harappans had with the contemporary Neolithic people of South India, is difficult to say. The tradition of painting red pottery with black pigment and the occurrence of long blades, copper tools and microbeads in the Neolithic have been ascribed to trade contacts with the Harappans and the Neolithic folk are proposed to have supplied the Harappans with gold and steatite (Rao 1973: 116). But such trade could have taken place only in the mature stage of the Harappan Civilization. The late Harappans of the Deccan were far too impoverished to have engaged in long-distance trade. It is also not explainable as to why the Neolithic folk having adopted the fashion of painting their vessels from the Harappans, refrained from accepting things of greater utility, such as the potter's wheel.

I now turn to Sind. After adversity had overtaken them, the Sind Harappans seem to have largely moved up the tributaries of the Indus, carefully avoiding the already desiccated lower valleys of the Sarasvati-Drishadvati. They were not traversing lands entirely unknown to them. They had already settled at places such as Kotla Nihang Khan and Ropar (Rupar, now named Roopnagar) in the Sutlej basin. Lower down, at Rakhigarhi in Hissar District in the upper Sarasvati Valley, they had established themselves during the Mature (if late Mature) stage of their civilization. With the cultural center of the civilization in disarray, the process of degeneration started and the urban character of the Ropar and Rakhigarhi settlements disappeared. This region had already been settled by the Barans, whose culture was a cognate of the Pre-Harappan Sothi/Kalibangan I Culture of the Sarasvati-Drishadvati Valleys that provided important elements to the make-up of the Harappan Civilization. It can indeed be called "proto-Harappan" (Ghosh 1965: 116; Lal 1979: 94).

In fact there are not many late Harappan settlements in Haryana where the Sothi/Kalibangan I/Bara element is not present. In Haryana these later settlements are located outside the flood plains of the seasonal streams (Dikshit 1979: 125), as if the people were intentionally avoiding the floods. The pottery shows a general decadence in fabric, potting and surface treatment (Dikshit 1979: 125). Incised designs, a Sothi characteristic, occur on the exterior of the pots.

Recent discoveries have shown that at some sites in Jammu, Punjab and Haryana the late Harappans even lived with the totally different Painted Gray Ware people (J.P. Joshi, personal communication). This phase is of great significance to the study of both the late Harappan and the Painted Gray Ware and requires further investigation. Further east, in western Uttar Pradesh, at sites like Bargaon and Ambkheri the admixture of the late Harappan with the so-called Ochre Colored Ware is also found (Dikshit 1979: 127), though at many other Ochre Colored Ware sites Harappan traits are absent (Gaur 1971-72: 10).

Thus, late Harappan took different hues in different parts of its diffusion and it cannot be regarded as homogenous. (That is why I have refrained from using a capital initial in the word "late.") All, however, share the common features of deurbanization—the relative smallness of the settlements, lack of monumental buildings and the absence of long-distance trade. While typical Harappan seals occur at some sites, they seem to be more survivals of the past than objects of effective use. No doubt, graffiti on some pottery bear a resemblance to the Harappan alphabet, but their scriptal value remains to be established.

In conclusion, I would like to say that it seems to have become a habit to dub cultures "late Harappan" without defining and pinpointing the differences. I admit that I have myself used the term loosely in the preceding paragraphs. I feel that the time has come to organize a seminar on the late Harappan cultures themselves, in which our colleagues from Pakistan should participate, as without them no consensus can be reached.

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F.R. ALLCHIN

32. The Legacy of the Indus Civilization

THIS paper was originally written in the spring of 1974. It was planned as the first of a series of essays in which I intended to put forward my personal ideas on certain topics with the aim of inviting discussion and criticism. For this reason I have thought fit to leave aside the usual apparatus of references and footnotes. My doing so is in no way intended to detract from the many scholars whose work and ideas have contributed to my own. Nor is it to deny or minimize the importance of the many different, often conflicting, views which others, often better placed than myself, have published on many matters. But to do justice to all such views would have necessitated a book rather than an essay, and would have defeated my own aim. In presenting the paper several years after its composition I have made a small number of editorial changes and introduced some new matter where new discoveries made this possible or desirable. A second essay, dealing with the Indo-Aryan languages in relation to archaeological evidence, was read in Dushanbe in 1977, and as the proceedings of that meeting appear as though they will be long delayed it is now in press elsewhere.

One thing is beyond a peradventure: that the cultural-historical phenomenon known as the Indus Civilization was, from the moment of its first inception through to its final stages, a unique event, the like of which the Indian Subcontinent had not seen before, and the like of which it was not to see again for almost a thousand years thereafter. The same cannot be said for the second civilization, which developed in North India during the first millennium B.C., and which has justly been spoken of as the Ganges Civilization; although it spread far more widely than the valley of that river. As the successor to an earlier civilization the question must arise of what, if any, links of culture or tradition survived through the intervening centuries, and of what, if any, awareness there was on the part of the founders of the new cities that they followed in the footsteps of those earlier city builders. Was there, indeed, a Harappan legacy, and if so what form or forms did it take? How far did it contribute to the tradition of the later Indian Civilization? This present essay is an attempt to examine these questions at the level of hypothesis.

The discoveries of the first twenty-five years of Harappan studies, massive and valuable as they were, left many questions unanswered. Those of the second quarter century have been more varied, and as a whole on a more restricted scale. If they have answered some questions, they have also posed many more. As more and more data accumulate I have become increasingly aware of the need for a conceptual framework within which discussion may fruitfully develop. Similarly one needs a set of general hypotheses relating to the several aspects of the civilization. There is reason to be grateful to Dr. Malik for drawing attention to the comparative backwardness of this aspect of Indian archaeology, in his *Indian Civilization: The formative period* (1968). With the growing up of a younger generation of Indian archaeologists the subject may be said to be coming of age, and the spate and quality of publications, particularly by younger workers is, in my view, most encouraging. But not much has yet appeared which relates to the broader aspects of the subject under review, and one should like to commend one of the most senior of Indian archaeologists, Professor Sankalia, who has recently suggested the need for the interpretative disciplines implicit in the 'new archaeology' in this context (1977).

While considering this question one became aware that any such general hypothesis must be prepared to treat the rise and fall of the Indus Civilization as an organic process, for it seemed difficult to discuss the legacy until one knew who had made the bequest and how he had acquired the things he had to bequeath. In consequence this paper is divided into two parts. In the first part the origin of the civilization and its relations with neighboring regions are discussed; it touches on two tendencies, towards cultural convergence and cultural divergence, and on the spread of the civilization. The second part begins with a discussion of the "end" of the civilization and what it entailed, and goes on to ask what was lost and what remained. This leads one to think of the different status of a "great" tradition and folk traditions in the context of the Indus Civilization. Finally, India in the Post-Harappan Period is discussed, speculating on the media through which a legacy might have been transmitted to the new cities of North India.

PART ONE

Perhaps the most significant discoveries of the past two decades have been those relating to the spread of peasant settlements in the Indus Valley in Pre-Harappan (or as one should prefer to call them, Early Indus) and even earlier Neolithic times. Among the excavated sites of this group are Amri, Kot Diji, Gumla, Harappa and Kalibangan. In the north an extension to the foothills is indicated by the discovery of Sarai Khola near Taxila. The development must have resulted from the initial exploitation of the rich flood plain of the Indus and its tributaries, and must have spread outward with the expansion of the population this produced. It seems to have been accompanied throughout by a tendency toward cultural convergence, and it provides the unequivocal basis in terms of human, technical and cultural resources on which the succeeding Mature stage of Indus Civilization is based. From the present point of view the maturity of the civilization must be seen as the climax of an organic developmental process starting in the early Indus times, if not yet earlier. Acceptance of this model suggests profoundly important analogies between it and the luminous words of Robert Redfield (1956: 77 ff.) respecting the special character of Indian Civilization as indigenous, having "developed out of the precivilized people of that very culture, converting them into the peasant half of the same culture-civilization," so that "the continuity with their own native civilization has persisted," peasant tradition affects the doctrine of the learned, and there is continuing interaction between the learned and folk levels. In short, while there is no reason to neglect the possibility that the Indus Civilization arose as a partial result of stimuli applied from outside, either from the uplands to the west, or more distantly from the Persian Gulf or Mesopotamia in the Early Dynastic or Sargonid times, or from Central Asia, and that these stimuli may have involved the arrival of men as well as ideas, its actual emergence must be seen primarily as a dynamic socioeconomic process, taking place on Indian soil, and not as something implanted from outside. This is profoundly significant for subsequent developments, since it implies that the legacy of the Indus Civilization may be sought in the life style of the common people of India and Pakistan, as much as in the learned tradition. This is exemplified by such things as the identity of ploughing patterns in the fields of Pre-Harappan Kalibangan and of the modern peasant population of the region; or by the direct analogy of one of the distinctive types of terracotta model carts from Mohenjodaro to a type which today survives only in upper Sind. These things can only mean that there is a direct and unbroken craft tradition or tradition of agricultural practice linking the two periods, and this in turn implies a continuum of population and a direct and unbroken rural life style from the Early Indus times forward.

Another important set of discoveries has provided evidence that the hunter-gatherers, using a stone technology and generally spoken of as Mesolithic, or Late Stone Age, had spread widely across the Subcontinent long before the emergence of the Indus Civilization. The current excavations of the French Archaeological Mission at Mehrgarh near Sibi have added a new perspective to the knowledge of the antecedents of the Indus Civilization, and may be expected in particular to throw very important light on the earliest stages of the development of settled agriculture in the Indian Subcontinent. This in turn is likely to contribute to the understanding of relations of the first agricultural communities to such groups of hunter-gatherers. Further, it is beginning to emerge that, at least in those places where evidence is available, groups of these people continued to live predominantly as stone-using hunter-gatherers, sometimes driven into areas of relative isolation, long after the use of metals had become common in the more advanced communities. It is now apparent that even before the emergence of the Indus Civilization in many regions of South Asia peasant or pastoral communities had appeared, and that in some cases these groups may have enjoyed social, economic or political relations of one kind or another with the Pre-Harappan settlements. How far both these and the settled communities arose as the result of the age-old tendency of peoples to move into the Subcontinent from the less hospitable lands to the west or north, and how far they arose by a process of local evolution from among the existing tribal populations has yet to be established. Probably both tendencies played their parts. But it is in such early settlements that the first localized cultural characters of some of the regions can be distinguished. The coexistence of groups at different socioeconomic and cultural levels, in close association with each other, often over long periods of time, may already at this stage be clearly distinguished. Both these tendencies were to play a significant role in the subsequent lifestyle of the regions of the Subcontinent. Thus they deserve to be borne in mind while considering the transmission of the legacy of the Indus Civilization.

It has been suggested that already during the Early Indus stage there was a period of rapid expansion of settled population throughout the Indus Valley and that it was accompanied by an outward spread towards less densely settled but attractive areas. This process may have involved both the establishment of new settlements in regions hitherto largely unsettled (i.e., populated by groups of hunters and collectors, or by primarily nomadic or seminomadic pastoralists); and the conquest or colonization of areas which already had a settled agricultural population. In some cases it may have involved the establishment of new settlements among the settlements of the already existing regional culture. Such variations in the pattern of culture contact are likely to be recognizable in the archaeological record, once their hypothetical existence is admitted. At a certain point this process triggered off changes resulting in the formation of cities, and the development of a new set of socioeconomic relations—the Indus Civilization. One must expect the same processes of growth and spread to have continued thereafter, and hence one would expect to find an outward spread of the Mature Urban Culture into areas hitherto peopled by tribal and/or peasant communities. Evidence to support this hypothesis appears to be forthcoming in several regions. In Saurashtra and Gujarat, Harappan settlements seem to be dispersed among those of a regional peasant culture, and this must be presumed to have led to contacts between the two at various levels. In East Punjab, in the Drishadvati and Sarasvati Valleys, and even further east in the Ganga/Yamuna *Doab*, there are somewhat similar indications. Dr. Suraj Bhan has reported sites related to the Early Indus stage at Kalibangan, and their continued occupation alongside sites which may more properly be called Harappan. This suggests the sort of culture contact situations to be found in the areas in which this spread was taking place. It is interesting to notice how the Rajasthan desert seems to have acted as a barrier to expansion, even though there was already a population of tribal people of mixed economy (as at Bagor) and perhaps also of agricultural settlements in parts of the region, and finds of Mesolithic tools suggest that such people were widely distributed there. One may expect that they enjoyed some sort of contacts with the Harappans prospecting for ores or raw materials and trading with them in such things as metal tools.

Within the area embraced by the Early and Mature Indus Civilization two opposing tendencies may be noticed: one convergent and the other divergent. The first is the more prominent: It has long been apparent that one of the concomitants of the change from the Early to Mature Indus Cultures was the establishment of an extraordinary degree of cultural uniformity over a vast area. This convergent tendency is indeed already clearly visible during the Early Indus Period, and as this fact becomes more apparent it makes the change of style from Early to Mature Indus times all the more remarkable. Sir John Marshall discussed this aspect at length, and others have generally agreed with him. What was involved in terms of the population as a whole can only be partly guessed at, but it seems that the convergent tendency reached a new height with the growth of Mohenjo-daro as a city, and therefore that the tendency may well go back to the foundation of that city whenever it may have been, perhaps towards the end of the second quarter of the third millennium. Presumably it would have more or less coincided with the first development of a full system of writing and the manufacture of inscribed seals. This seems to have been the signal for a rapid and wholesale diffusion of traits recognizable in the archaeological record, suggesting the spread or imposition of a common lifestyle which in time extended throughout the entire Harappan Culture region. The means for this spread remain unclear. That it was assisted by an unprecedented extension of internal trade in all manner of raw materials and commodities may be safely inferred, and that it witnessed a distribution of the specialist craft products of the cities is probable. Among trade goods one may cite the stone blades which appear to have been obtained and manufactured at such centers as the vast factories at Rohri, the similar indications of centralized manufacture of various classes of metal objects, of shell bangles and carnelian beads. An aspect of the mechanism by which this trade was carried on has been discussed by my wife (B. Allchin 1979) It seems certain that the emergence of urbanism must have also involved the extension of a single unifying socioeconomic pattern, including government and administration, and of a common pattern of beliefs and ideology. In sum it must have witnessed the promulgation of what one may call the Indus lifestyle, with all that went with it. The fact that the geographical confines of this culture region embraced an area far greater than that of any other of the great civilizations of the third millennium makes the process all the more remarkable. It may also be stated with certainty that the lifestyle incorporated not only popular matters but also the learned or 'great' tradition of the Indus Civilization. It is from among these things that scholars have found, or at least believed that they found, all manner of traits ancestral to those of later, even of modern, Indian civilization.

However, while recognizing the convergent tendency in the Indus Civilization, one must not neglect to notice the indications of regionalism or cultural divergence within the greater Indus system, leading to what may even be seen as separate culture provinces. One would expect there to be several kinds of divergence. First, the very real differences which already begin to emerge during the Neolithic stage, and later within the provinces of the early Indus Culture regions between such sites as Amri, Kot Diji, Gumla or Kalibangan, evidently continued to a certain extent, even after the imposition of the Indus style, reflecting no doubt these earlier differences. Second, even during the comparatively short life of the Mature Indus Civilization one may expect that there would have been a further general tendency towards separate development in certain respects in the different provinces, due to all sorts of possible causes. The divergences could in part reflect local reactions against the convergent tendency. A third possible cause could be the arrival in a given region of new groups who established some sort of power over, or relationship with, the existing population and proceeded in one way or another to influence the final stages of the Indus Culture therein. This aspect is crucially important in terms of legacy, and it must be considered further. A fairly circumscribed regional development appears to be represented by the Cemetery H Phase at Harappa and probably at related sites (at Bara and sites of East Punjab, in Bahawalpur, etc.). One is inclined to follow Vats in seeing this phase as a final stage in the Indus Culture representing the arrival of some sort of "Aryan" invaders in the region and their interaction with the existing population, leading to a degree of cultural synthesis. Another set of data which suggests something of the same kind is provided by the apparent contrast between certain sites at which stone or terracotta *linga* are reported, notably at Mohenjodaro, at Harappa, and at Surkotada, and other sites (or perhaps a phase at some sites) at which "ritual" fire altars are reported. Such altars are expressly absent at Surkotada, and also apparently at Mohenjodaro and Harappa, but are reported at Kalibangan from the beginning of the Harappan Period. Here several types of hearth are found; among them one is distinguished from the normal domestic types by the excavators. The "ritual" hearth, with a brick or clay "pillar" in its center occurs in three locations: on the top of a brick platform in the walled brick "Citadel" enclosure a row of seven were found, associated with a brick pit containing animal bones and with a well; single examples of the same type occur in small rooms in domestic houses, perhaps used for domestic rituals; and several more were found in a square brick enclosure (KLB 3) outside the east wall of the lower city (Thapar 1973: 101). These three contexts suggest that fire rituals formed a part of the religious life of the town, at a civic, domestic and popular level. They are also highly suggestive of an Indo-Iranian, if not more specifically Indo-Aryan, element in the culture of the period covered by these excavations.

Thus, if enough evidence of this sort were forthcoming, the regional divergences might in some instances be associated with the meeting of indigenous Indus populations and intrusive Indo-Iranian or Aryan elements, and with some sort of resulting cultural synthesis. This would clearly be of great significance for any discussion of legacy. It is of course wholly possible that similar intrusive groups may also have moved into the southern Indus provinces, but if they did so they seem to have coincided with a more or less complete extinction of the centralized urban authority rather than with its late stages, and their contribution to the legacy may be expected to have been therefore mainly at the village level. Thus there is likely to have been a major difference between the situation in the northern and southern parts of the Harappan Culture region.

One must now consider certain aspects of the civilization which resulted from this transformation of existing peasant and tribal social elements. The access of new data has already revealed much and doubtless much more awaits both discovery and analysis, but some aspects remain, and are long likely to, elusive for the archaeologist. Thus while one is learning more about the town planning, and such things as house plans, plant and animal foods, technology and crafts, one still has only rudimentary indications as to the meaning of all these in terms of social and economic relations. Similarly, while there are seals and art objects which reveal a clearly defined body of symbols and myths, there is still surprisingly little definite knowledge of the religious beliefs or ideology of their makers, although here one is beginning to gain an important new dimension from finds in the Early Indus Cultures. The reading of the script will almost certainly throw new light on trade and economics, and perhaps marginally on ideology, but even so the absence of longer inscriptions must mean that many topics will remain essentially speculative. This point is made mainly because it is just in these fields, in economic and social relations, in religious beliefs and ideology, that an important part of the Harappan legacy is likely to be most strongly evident in later Indian culture, and if one cannot positively identify such things at their source, how far is one entitled to speak of the legacy at all? This prompts one again to stress the importance of the framing of general hypotheses, as without them the contexts of individual facts, or groups of data, may be difficult to establish.

PART TWO

There is still much room for divergent views about the end of the Indus Civilization, but as this event provides, in a sense, with a terminus for consideration of the legacy, as opposed to the nature of the civilization itself, one must try to establish a satisfactory general hypothesis. The civilization has been thought of as a social, economic and cultural phenomenon produced as a consequence of the build up of population on the fertile plains of the Indus and the Punjab. It involved a delicate balance of internal relations between cities, towns and villages, and of external relations with neighboring peasant societies and with more distant urban societies. The end of the civilization probably arose from some major upsetting of this balance. This could have been produced by a variety of causes, acting either singly or in combination. It is possible, although there is as yet little supporting evidence, that there was a deterioration of climate; but as the main food production depended upon exploiting the Indus river's flood plain inundation this is unlikely to have been sufficient cause. It is possible too that there was a "wearing out" of the land, due to overcultivation; but in the light of the enduring fertility of the soils of the Indian Subcontinent over subsequent millennia of intensive cultivation this too seems unlikely. One accepts Lambrick's 1967 demonstration of the implausibility of the theory that Mohenjodaro was engulfed in a vast flood, and one is inclined to agree with his well-argued case that there may have been disastrous changes in the course of the Indus, resulting in the desiccation of areas which were essential for the feeding of the city's population, as a more likely cause of the end of that city. Such an event would lead to depredations by tribesmen from the nearby hills, and might well have brought about the desertion of the city and of outlying settlements. But would it have been a sufficient shock to upset the whole balance? This is a more difficult question, even if it is assumed, as it is more and more, that Mohenjodaro was in some way the "epicenter" around which the whole structure was held in balance. Would the attackers have been Aryan? This one cannot tell, but both in terms of the probable date of the event, and of the history of the dispersal of the Indo-European language family, there is no inherent impossibility in such a thing. If this was the state in Sind, what of the Punjab? Here too there are suggestions that there may have been major changes in the channels of rivers, due in part no doubt to tectonic events; but there is no very clear evidence that any of these coincided with the end of Harappa or Kalibangan. Moreover as has been seen at both sites there are suggestions that there may have been a period of coexistence of the population with conquering "Aryan" elements. Nevertheless, whatever may have been the cause or causes of the end of the civilization, what is of primary concern is that at a certain point in time it came to an end.

One must now proceed to consider "what was lost" and "what survived." Clearly the postulated central power and authority, together with whatever administrative machinery it possessed, must have been the first to go; and with them the economic organization and the highly organized trade or exchange of goods. All of these would seem to have followed upon the abandonment of the urban nucleus at Mohenjodaro, if this were the primary cause of the breakdown. But there need not, indeed there is most unlikely to have been, a comparable or simultaneous abandonment at all the other centers. Even if there is a marked and abrupt break in the material culture, this need not indicate desertion of a site, followed by reoccupation, but it may indicate no more than a withdrawal of the centrally imposed "urban" uniformity, and a return to (even reemergence of) the regional peasant styles. In some cases the break may indicate the arrival of conquerors, and the imposition of new elements upon the existing style. The uniformity of the Indus period is replaced by a whole series of local culture patterns; and at the socio-economic level the breakdown of the centrally imposed authority must have been marked.

These things one may expect to have disappeared in their entirety. But what was retained or at least partly retained? First, many of the crafts and technical skills which were flourishing also at village level, and for which there would have been a continuing demand, would have persisted; while certain specialized urban or luxury crafts, including seal making, would have disappeared. Some parts of the urban lifestyle may have partly survived. For example, writing and the uniform system of weights and measures would almost certainly have gone as coherent systems, but must surely have left certain signs or convenient units of weight or measure in use. Many domestic aspects of the Indus lifestyle, the house plans, disposition of water supply, hearth and kitchen types, attention to bathing, etc. would survive in the settlements, and much could have been absorbed by newly arrived barbarian conquerors. There would be a very wide survival of traits pertaining to ideology and religious belief, particularly of those which were in common acceptance and which involved domestic practice.

The religious beliefs of the Indus Civilization would have been maintained in several ways: first, in the cities there must have been a class of specialist exponents or priests (who may also have constituted, or been closely associated with, the administrative group). Such people would be among those more likely to intermarry with a new ruling class, or in other ways to win for themselves positions of power or influence in a new order. Such a pattern was often witnessed much later, during the centuries of early Muslim conquest. Thus they would find themselves in a position to maintain an important body of their own beliefs, and to pass it on to their children, if not to their conquerors. At the popular level, tradition must also have been passed on within the family, in much the way as it has continued to be in India down to modern times. Through these two channels the cult of sacred places, rivers or trees, of sacred animals, and of symbols or myths would have survived; as too might a large part of the cosmology, philosophy and other parts of the learned tradition, even after the end of the cities. The strength and maintenance of the tradition would be greatly enhanced if, as one is inclined to believe, the initial period of "Aryan" settlement in the north coincided with the survival, at least for a time, of more or less full urban life under foreign rule, and with a situation such as that which one has surmised the Cemetery H Phase to have witnessed. This period of coexistence would have provided an opportunity for the priests or administrators to acquire the language of the conquerors and to have begun integrating the ideologies of the two groups. Here too the rapid acquisition first of Persian, later of English, by higher castes may suggest an appropriate model from recent times. Thus from the meeting of the two a new amalgam, an *Indian or Indo-Aryan cultural tradition was born.* This hypothesis does not demand "armies" of invaders. One would expect rather small bands, whose horses made them relatively mobile, and who may often have achieved whatever power they acquired by means other than open warfare. It is still not possible to decide at what precise stage groups ancestral to the authors of the *Rigveda* arrived, but one believes that there was a period during which there was a general restlessness, and it may well be that a whole series of waves drifted into the Indus Valley and the Punjab over succeeding centuries. This, after all, has been a pattern which continued through the historical period also. It is not even necessary that all the groups should have been Indo-Aryan speaking, or even Indo-Iranian. But it may be imagined that the closer were the ties of language and ancestry between such groups, the more marked would have been their own solidarity, and the polarity between them and the indigenous population.

Thus one can see that the survival and onward transmission of the Harappan legacy must have been at several different levels and of several different kinds. First, a widespread survival of the way of life among the common people particularly in the villages, in each of the main areas of settlement; and associated with this there would have been the survival of a series of little traditions in the several culture regions into which the peasant societies of Post-Harappan times devolved. With the removal of the urban authority the difference between the structure of village societies within and without the confines of the civilization would have been considerably reduced, and roughly similar structures would appear throughout. At the same time there would be a tendency for older, distinctive, culture traits to reemerge regionally. Hence, in all these regions one may expect the Harappan legacy to be passed down at the folk level, and to spread with the continuing expansion of the peasant society. Indeed this was probably the time when the village assumed the dominant role in Indian society which it has continued to occupy henceforward; so that while cities may have come and gone, the villages have survived with their own special Indian lifestyle. But at this level the surviving elements would be mainly those appropriate for the folk or village society, and many others of distinctly urban character would tend to disappear.

A second kind of transmission of the legacy must have been at the level of the great or learned tradition and would presumably have been much more restricted geographically, being mainly confined to those areas in which there was already a synthesis of Indus urban and "Aryan" ruling elements, during the later stages of the civilization. This sort of transmission probably developed in the Punjab and spread eastwards with the expansion of population and settlements into the *Doab* and Ganges Valley. Already by the time of a compilation of the Vedic *Samhitas* the process must have been providing an increasingly distinct element of the ideology, which one may now begin to call Indian, or culturally Indo-Aryan, as distinct from either Indus or Aryan. This is not the place to discuss the interesting and important question of which among the several groups of possible Aryans constituted the first arrivals in the Indus culture region; whether they were "Pre-Vedic" or "Non-Sanskritic," or "Proto-Rigvedic." This matter has recently been discussed by Dr. Parpola (1977a, 1977b) and I have touched on it in another paper (F. Allchin in press). But one has long been of the view that they must be regarded as culturally at least the direct ancestors of the Vedic Aryans. In these areas of course the transmission at the folk or village level also took place, and this in turn would have facilitated at a later date the secondary spread of the great tradition to other regions sharing the legacy at those levels. This hypothesis does not altogether preclude a similar survival of elements of the great tradition in other regions, notably in the South, in Sind or Saurashtra and beyond, but one believes that there it would be relatively much less powerful than in the North.

If the legacy thus transmitted was partly at the level of the great tradition, it is unlikely that it was done without considerable attenuation. The use of writing seems to have vanished, indeed one does not know how far it was used in Harappan times for purposes other than narrowly commercial, and probably much else with it. But the newly emerging Indian tradition must have received continuing enrichment from the folk level, and much may have survived at that level, to be later reabsorbed into the learned tradition.

The period following the end of the Harappan cities was one of continuing eastward expansion of Indo-Aryan Culture, now associated with the cultivation of rice and with an unprecedented growth of population. One may expect that already in the East (and for that matter the South) there were distinctive peasant societies in existence, each with its own cultural tradition, and thus the spread of the Indo-Aryan great tradition would have coincided with its encountering them. These factors led to the rapid expansion of settlements in the upper, middle and lower Ganges Valley and paved the way to the re-emergence of cities there. These, like their Indus predecessors, were the products of their social and economic bases. But it is important to note that they were not the centers for the emergence of the early Indian tradition. This tradition was there before the cities, in the shape of the Vedic *Samhitas,* the accompanying schools of exegesis, and all that went with them; and also at the level of a more or less related series of little traditions, transmitted at the folk level. The new cities produced, however, a profound, even traumatic, reformulation of received tradition and ideology, and witnessed the development of Buddhism, Jainism and the other new "city" religious movements, notably Vaishnavism. But throughout this reformulation the prior existence of a tradition, from which to borrow and against which to react, can be clearly recognized. Thus while the life style of the Gangetic cities is also in many ways new, it embodies an incalculably large element which is very old, and which survived in one way or another from the earlier cities of the Indus.

The hypothesis advanced must be tested against the available data. For example, the presence of *lingas* or of an iconographic type suggestive of Śiva-Paśupati in the Indus cities, has often been seen as anticipating the later "emergence" of Rudra-Śiva in the Vedic-late Vedic literature. One may now postulate that Śiva-Mahādeva was a central concept of the Indus religion, which survived in both the great and folk traditions and developed as the process of the Indianization advanced. A problematic gulf appears to separate the narrow Indo-Iranian, polytheistic ideology postulated by philologists as that of the early Vedic hymns, from both the mature "Indian" character of the "late" hymns of the first and tenth *Mandalas* of the *Rigveda,* and their remarkably constant interpretation in Indian tradition thereafter. Although the gulf may be partly illusory, it undoubtedly exists. Just how early this shift began would depend, in terms of this hypothesis, upon the date at which the cultural synthesis of the two groups began. It is also worth considering whether the decline of the *Asuras* and the rise to eminence of the *Devas,* which seems to be happening in the body of the *Rigveda,* and to be looked back on as something already complete in such hymns as X.124, may indicate not so much a divergence of beliefs among separated Indo-Iranian groups, but rather—by this time—the process of Indianization in action.

One does not propose to anticipate objections to this hypothesis, but one is well aware that at more than one point the data are not available from which even a probable conclusion may be drawn, and where therefore it is possible to propose various alternative hypotheses. One such point concerns the moment when "Aryan" influence first began to exert itself on the Indus Civilization. For instance, one possible version would be that it was the arrival of Indo-Aryan speakers which provided the initial stimulus needed to tip the scales towards city life, and thus that the whole Indus Civilization from the start may have had a dominant Aryan strain. This hypothesis, attractive as in some ways it is, can only be sustained in the face of formidable objections, but it must not be too lightly dismissed. At the other extreme it is possible to argue that there was a final and irrevocable gap between the end of the cities and the arrival of the ancestors of the authors of the *Rigveda.* This, raises almost insuperable problems of interpretation, not least in terms of the transmission of the Harappan legacy. Thus one is led to prefer a hypothesis which lies somewhere between the two extremes, that is, bringing the first Aryans into contact with the still flourishing Mature Indus society.

To sum up the main points of this essay—The Indus Civilization arose on Indian soil as an organic process: it was not primarily superimposed from outside, even if external stimuli may have contributed. Because of this there was already the necessary basis of continuity between the peasant and urban communities to permit the sort of persistence of the lifestyle which Robert Redfield remarked. An outward spread of peasant cultures from the Indus system had already begun in Pre-Harappan times, and the lifestyle spread with the continuation of that process both during the Mature Indus Civilization and after. Within the Early Indus and Mature Indus Civilization the tendency towards cultural convergence implies the emergence of a central ideology and learned tradition, and this one may call the Indus great tradition. In the north of the region there was an appearance of Indo-Aryan speaking people even during the life of the civilization, and this permits one to postulate a degree of synthesis between the exponents of the Indus great tradition and those of the arriving conquerors. This process is of enormous significance in terms of the onward transmission of the legacy, and of the translation of the Indus tradition into a unified Indian or culturally Indo-Aryan tradition. The end of the Indus Civilization appears to have been brought about by an upsetting of the delicate balance which maintained its social and economic life, and was probably linked with the abandonment at Mohenjodaro. The Indus legacy survived and was passed on most widely at the folk or village level, in almost all regions, while the learned tradition mainly survived in the Punjab, whence it spread eastwards with the spread of settlements in Post-Harappan times. The surviving tradition, an amalgam of Indus and Aryan elements was already active before the reemergence of cities in the Ganges Valley and in North India more generally during the first millennium B.C., and served as the ideological basis upon which the cities produced their own distinctive ideology. Therefore, to paraphrase an old saying: "if you seek a legacy, look about you."

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B.B. LAL

33. West was West and East was East, but When and How Did the Twain Meet? The Role of Bhagwanpura as a Bridge between Certain Stages of the Indus and Ganges Civilizations

WHEN in 1952 the report on the excavations at Hastinapura was written there was no evidence to show that the Painted Gray Ware (PGW) Culture overlapped with the Indus Civilization or even with any of its devolutionary phases. The present writer, therefore, placed the PGW occupation at Hastinapura broadly between the end of the Indus Civilization on the one hand and the beginning of the Northern Black Polished Ware (NBPW) Period on the other, adding that although there was no overlap between the PGW and NBPW at Hastinapura, such an overlap at other sites could not be ruled out (Lal 1955: 150).

Subsequent excavations have shown that toward the end of the PGW Period, the NBPW does emerge and that there is a *continuous* story from the PGW Period onwards, as at Atranjikhera for example (Gaur and Hasan 1964). Indeed, it is the PGW Culture that provided the real base to what was to happen in Madhyadesh (a term used in ancient literature to denote broadly the area comprising the upper Ganges Valley) for centuries to come. And it is possibly this aspect that led Wheeler to use the term "Ganges Civilization" (1960: 127-28). But the question of an overlap between the Indus and the Ganges Civilization, here symbolically called West and East, remained an open one.

During the course of his excavations at Kausambi, G.R. Sharma discovered that the fortification wall around the site had a mud core but was provided with a battered burnt brick revetment on the exterior (Sharma 1960). He also discovered a corbelled drain, again of burnt bricks (Sharma 1960). The burnt brick revetment reminded him of a similar revetment at Harappa, and the corbelled drain (called an "underground passage" by Sharma) brought to his mind the drain associated with the Great Bath at Mohenjo-daro. All this led him to stipulate that the architecture of the fortifications and drain at Kausambi was borrowed from that of the Indus Civilization. He stated:

> The early defences at Kausambi closely recall the Harappan citadel. The mud-packed rampart revetted externally with baked bricks in the so-called English bond in alternate courses of headers and stretchers, battered back to angles of 20° to 40°, bastions at intervals, rectangular towers and underground passage built on corbelled arch, are significant features of architecture at Kausambi with prototypes for each one of them in Harappan architecture. The very idea of town life was so far unknown in the Gangetic Valley. The defences show that in the first centuries of the first millennium B.C. Kausambi developed as a town fully equipped for its protection by the magnificent defences built on the Harappan pattern. Evidently, this was not an achievement of the P. G. Ware culture which shows a distinct aversion

> to the very concept of urban life in its earlier settlements in the Ghaggar Valley, the Punjab and Western U.P. Nor can it be associated with the Red Ochre-washed Ware. It is equally significant that P.G. Ware occurs at Kausambi two structural periods after the original construction of the defences. The recent discovery at Alamgirpura (District Meerut, U.P.) has established definite evidence of the penetration of the Harappan culture in the Ganga-Yamuna Doab. If the Harappans could reach the banks of the Hindon, a tributary of the Yamuna, the percolation and the survival of the Harappan influences at Kausambi, only 300 miles down the Yamuna, *is more than likely* (Sharma 1960: 6) (emphasis mine).

According to Sharma, the Kausambi fortifications went back to 1025 B.C. (1960: 22).

To strengthen his stand, Sharma even drew attention to some pottery which he thought was comparable to that from Navdatoli and other western Indian sites and may have been produced under Harappan influence (1960: 6-7).

Sharma's dating of the Kausambi fortifications has been challenged by K.K. Sinha (1973) and A. Ghosh (1973: 81). The grounds they have adduced against such an early chronology are quite valid and one would have expected the excavator of Kausambi to rethink the matter. Instead, he has come out with renewed vigor about the Harappan influence on Kausambi, saying:

> The available evidence, particularly the pottery obtained from the lowest levels of the Defences and the Palace-areas suggest that the earliest settlement at the site can be pushed back to the mid of IInd millennium B.C. The recent physical comparison of the material of Bhagwanpura (Haryana) has revealed the existence of the late Harappan material in the Central Ganga Valley at the following sites. (Note of Sri J.P. Joshi enclosed herewith): Kausambi, Onaur, Unchadih and Kakoria. The chalcolithic cultures of the Central Ganga Valley show a fusion of the late Harappan and the Chalcolithic elements of the Vindhyas, the latter being preponderant (Sharma 1979).

In view of the foregoing, it is imperative to examine the matter once again.

While the positions Sinha and Ghosh stated in their comments still hold good, there are many more grounds to challenge the Harappan influence at Kausambi. For example, the Harappans are known to have used two brick sizes: 30 by 15 by 7.5 centimeters and 40 by 20 by 10 centimeters; but in both cases the length, breadth and thickness ratio was invariably 4:2:1. On the other hand, the average size of the bricks used in the Kausambi fortifications is 49.5 by 30.5 by 7 centimeters (Sharma 1960: 27). Quite clearly this size concept has nothing to do with Harappan bricks. If anything, the Kausambi bricks may have something to do with the measurement concept indicated by *angula, hasta, pada*, etc., enunciated in the literature of the Early Historic Period in northern India. Second, and this is a point which cannot be overemphasized, no site around Kausambi—be it Sravasti, Ayodhya or Sringaverpura to the north, or Rajghat to the east, or Atranjikhera or Ahichchhatra to the northwest—has yielded a burnt brick structure prior to the NBPW Period. In fact, very closely observed excavations in 1979 at Sringaverpura have revealed the possibility of dividing the NBPW Period into three subperiods. The earliest of these proposed subperiods is characterized by the absence of such distinctive pottery types as the pear-shaped vase (popularly known as Ahichchhatra type 10 A) and small incurved bowl, loosely called the "miniature bowl." It was also *devoid* of any kiln-burnt brick structure. This is not the place to go into the dating of the NBPW, but it can safely be said that the beginning of burnt brick structures is unlikely to go very much earlier than about the middle of the first millennium B.C. Now, if this is the case at all the other sites in the middle Ganges Valley, how can Kausambi be expected to stand in sheer isolation?

The so-called Late Harappan pottery at sites like Kausambi, Kakoria, etc., referred to in Sharma's 1979 publication was jointly examined by B.K. Thapar, K.N. Dikshit and myself in March 1979. It was observed that most of the specimens of the so-called "button-based goblets" were incomplete. Thus, the "button"-like part could easily have been mistaken for a base, while the flaired out portion could give the impression of the goblet shape. However, we were lucky to notice a complete specimen in the collection displayed at the Allahabad University Museum itself. This turned out to be a lid, the "button-base" being in fact a knob. Likewise, the so-called "beakers," which were again incomplete, were found to be the lower parts of a particular type of elongated vessel which was sometimes cylindrical and sometimes partly conical, with a flat or somewhat conical base. Many of the specimens had a slightly faceted exterior. These did not remind us of the typical Harappan beakers. As regards the dish-on-stand, it must be stated that this shape is not confined exclusively to the Harappan Culture, having been found in both the Ahar as well as the Malwa Cultures. In fact, the corrugated stem in the PGW Culture shows that a kind of dish-on-stand was available in that culture as well. Basically, therefore, there was nothing in the pottery from Kausambi, Kakoria, etc., which could really lay claim to being Harappan in the true sense of the term. Under the circumstances, it would not carry much weight to argue that if the Harappan Culture could reach Alamgirpur on the bank of the Hindon, a tributary of the Yamuna, why could it not reach Kausambi on the Yamuna itself? (Cf. Sharma's remarks as quoted above.)

But, one must put aside these personal assessments of certain disputed pottery types, and architectural features, which in themselves are not disputed, but whose ancestry is, and look at the problem as a whole. To sharpen the focus, one asks pointedly: Did Indus *urbanism* really reach the heart of the Ganges Valley? Even for the moment, if the Kausambi fortifications and drain are accepted to have been derived from their counterparts at Harappa and Mohenjodaro, one would still have to answer the question: How is it that only these two isolated features reached Kausambi, without the brick sizes about which the Harappans were so meticulous all over their area of thousands and thousands of square kilometers? And even if one would wish to overlook this point, there are much more important issues that stand out: What about grid patterned town planning? And if one ignores even this, what about the other elements which gave the Indus Civilization its urban character; like the seals and sealings, and weights and measures? None of these have been found at Kausambi—nor at any of the other sites excavated in that region (e.g., Sravasti, Ayodhya, Sringaverpura, Rajghat, etc.). To say that all these items have eluded the spade would be placing too much credence on chance. To be precise, whatever the future might have to reveal, let it be plainly admitted that in the present state of knowledge, *Indus urbanism did not reach the heart of the Ganges Valley.*

In fact, while Alamgirpur, Hulas (recently excavated by K.N. Dikshit) and a few of the other sites, do indicate an "infiltration" of Harappan Culture into the uppermost part of the Ganges-Yamuna *Doab,* even this infiltration is not of the Mature Phase, and certainly the sites concerned do not represent urban settlements like Mohenjodaro or Harappa or even Kalibangan. The situation would then seem to be that it was only toward the end of its life, in any case *after* the eclipse of its urbanism, that the Indus Civilization entered the Ganges-Yamuna portals. Thus, it could not have provided the urban base for the civilization of the Ganges-Yamuna Valley, which in fact witnessed that phenomenon only a millennium later.

But then did the West and the East, standing, as already mentioned, for the Indus and Ganges Civilizations respectively, never meet? The answer would be: As mature civilizations they never met. But there did exist a meeting point between the two. This was at a time when the Indus had *completely* lost its urban character and had been diluted, with the amalgamation of other cousin cultures, to a stage almost beyond recognition, and the Ganges Civilization was only in its infancy, much before it acquired its urbanism. This meeting is typified at sites like Bhagwanpura, Dadheri, etc. recently excavated by J.P. Joshi (1978). Bhagwanpura, Period IA yielded a few pottery types which had a Harappan affiliation, (e.g., the goblet) but most others were either only remotely derivable from the Harappan complex, or were influenced by the Pre-Harappan Culture. Indeed, even in this region the Pre-Harappan formed the base on which the Mature Harappan appeared like bubbles on a vast lake, only to disappear and merge into the waters of the lake itself. To quote Joshi:

> The pottery of this Sub-Period (IA) is comparable to late Harappan ceramic types available at Bara, Bahadarabad, Atranjikhera, Siswal LLB, Mitathal I IB, Daulatpur and Raja Karan-Ka-Kila. Goblets are available but no beakers or perforated jars are found. Painted and incised pottery is also available. The technique in incised red ware is reminiscent of fabric D of Kalibangan pre-Harappan ceramic industry. Pottery with Harappan graffiti marks is yet another important find (Joshi 1978: 98).

I have some reservations about the use of the term "Late Harappan," for the pottery from either Bahadarabad or Atranjikhera. Neither ceramic corpus could be called "Late Harappan," since this term would apply only to the stage ensuing immediately from the Mature Harappan. Anyway, as a whole the pottery of Bhagwanpura IA is an amalgam in which trends derivable from various sources can be discerned.

While one may also take note of the "Harappan graffiti" from this subperiod, let it be added that it is of such a kind that it does not establish the regular use of a script. At the most it implies a "hangover" of some symbols. But the more important point is the total absence of seals and sealings. Likewise, there are no weights or measures, nor are there the typical Harappan bricks, much less town planning. The faience beads and bangles do, of course, remind one of a Harappan survival. However, the point to be emphasized is that the Bhagwanpura culture complex, composed of what can be termed an amalgam of the *n*th generation of Harappans; the $n+x$th generation of Pre-Harappans and the *y*th generation of Harappan cousins, *was in no way urban*. It was in this essentially rural setting that the meeting with the PGW Culture took place, the period of overlap being termed IB at Bhagwanpura, and likewise at Dadheri.

In this context one point deserves to be highlighted: whereas the PGW Culture at sites like Hastinapura. Atranjikhera, etc., is known to be associated with iron, that at Bhagwanpura and Dadheri has been reported to be *without* that metal; although objects of copper were duly found (Joshi 1978: 98-100). This would place the PGW Culture at the latter sites at a stage earlier than that at Hastinapura, Atranjikhera, etc. This would also explain why there was no overlap between the Late Harappan Culture and the PGW Culture at, for example, Alamgirpur or Hulas. To elucidate, the Late Harappan Culture at Alamgirpur was earlier than the IA Culture of Bhagwanpura and the PGW Culture at the former site was later than the PGW Culture met with in Subperiod IB of Bhagwanpura. Thus, while there remained a gap at Alamgirpur, the same was bridged at Bhagwanpura.

Another aspect of this "standing apart" in the former case and the "shaking of hands" in the latter may now be emphasized. Since the meeting did not take place at the time of Indus urbanism, the same was lost forever. But, as the co-mingling took place at a time when there was a relapse into the rural stage, the rural traits of the Harappa Culture, and of its ancestor and cousins, survived. This is seen for example, in the crisscross ploughing pattern of the fields, and *tandurs* of the Pre-Harappan levels at Kalibangan (Lal 1971 and 1979).

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K.N. DIKSHIT

34. Hulas and the Late Harappan Complex in Western Uttar Pradesh

INTRODUCTION

In 1959, with the discovery of the remains of the Harappan Culture at Alamgirpur, on the River Hindon, a tributary of the Yamuna, a new possibility was opened: the Harappan Culture could have extended through the Ganges-Yamuna *Doab* (Indian Archaeology: A review 1958-59) (Fig. 34.1). From 1962 to 1965 systematic exploration was conducted by the Archaeological Survey of India along the River Budhi Ganga from Hastinapur to Hardwar as a follow-up to this discovery. Exploration in nearby Saharanpur District was also carried out by the Survey for the same purpose at about this time. This was directed by Shankar Nath (Indian Archaeology: A review 1963-64a and 1966-67). Thereafter Bargaon was selected for limited excavation (Indian Archaeology: A review 1963-64b).

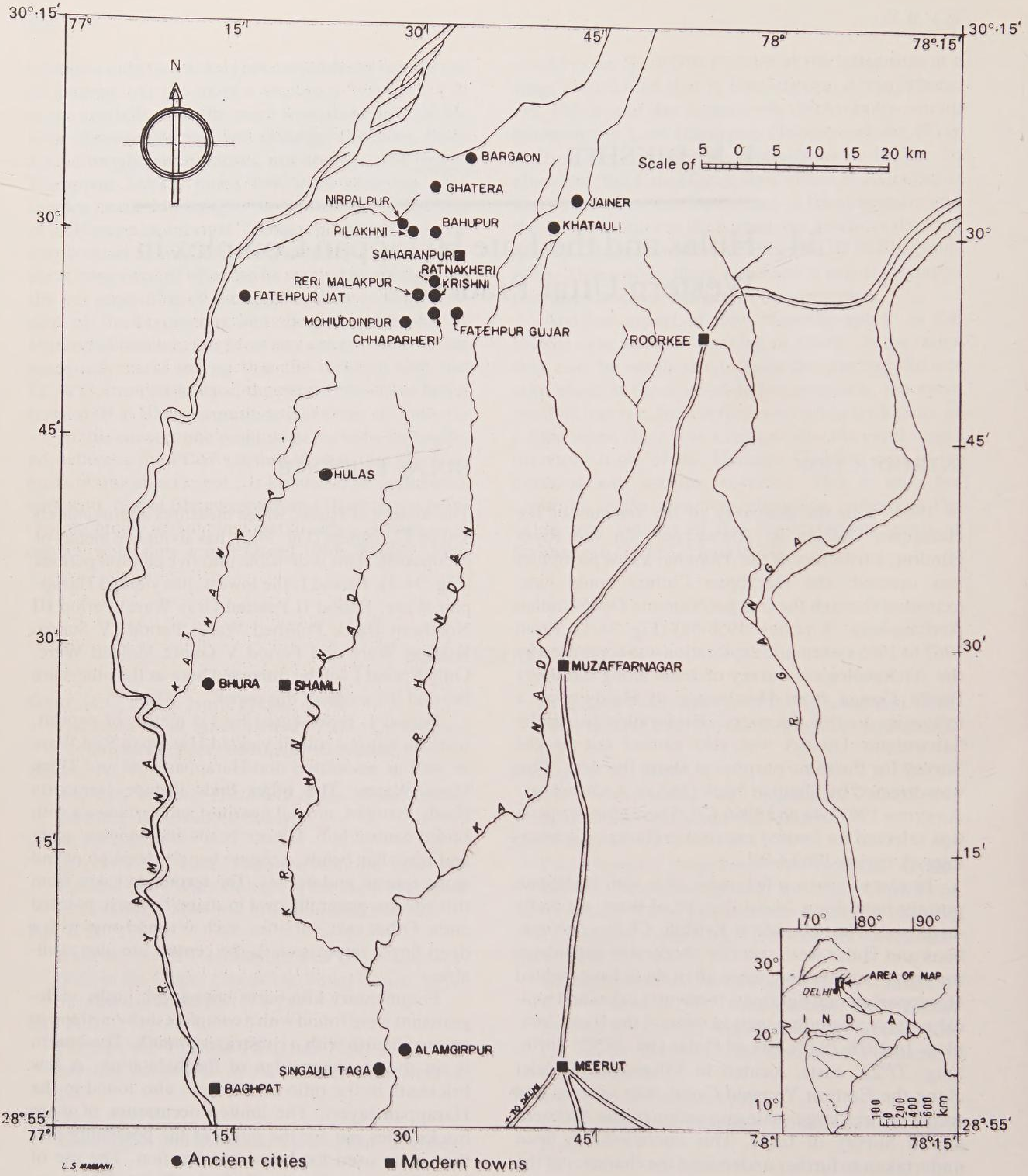
In recent years, a few more sites with Harappan pottery have been found; but all of them are badly disturbed. The mounds at Krishni, Chilhera, Nayabans and Hulas were recently checked as candidates for proper excavation, since all of them have yielded Harappan animal figurines, terracotta cakes and typical pottery, including incised ware of the Bara Complex. In 1978-79 the site of Hulas (lat. 28°43′ north; long. 77°22′ east), located in Saharanpur District along the Eastern Yamuna Canal, was selected and subjected to a large-scale excavation by the Archaeological Survey of India. This operation has been undertaken to further understand the character of the Harappan Civilization in a peripheral region, the State of Uttar Pradesh.

HULAS EVIDENCE

The mound at Hulas, which measures approximately 330 by 172 meters (Fig. 34.2), has about five meters of occupation. This is divisible into five cultural periods (Fig. 34.3). Period I, the lowest, has yielded Harappan Ware; Period II Painted Gray Ware; Period III Northern Black Polished Ware; Period IV Sunga-Kushan Ware and Period V Gupta Molded Ware. Only Period I will be discussed here as the others are beyond the scope of this paper.

Period I, represented by 1.4 meters of deposit, rests on natural soil. It yielded Harappan Red Ware as well as associated non-Harappan Red and Thick Gray Wares. The other finds include terracotta beads, bangles, animal figurines and cartwheels with raised central hub, faience beads and bangles, agate and carnelian beads, a copper bangle, bone point and stone querns and pestles. The terracotta cakes from this site are generally oval in shape but have pointed ends. Other cake varieties, such as round ones with a deep finger impression in the center, are also available.

Fragmentary kiln-burnt bricks with husks as degraissant were found with a complete dish-on-stand in an oval hearth with a constricted mouth. This hearth is on the southern edge of the habitation. A few brickbats in the ratio of 1:2 were also found in the Harappan layers. The limited occurrence of these bricks rules out for the moment the possibility that they were used for house construction. The use of burnt brick was also very limited at Ropar, Bhagwanpura and Alamgirpur, where houses were generally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KRISHNI
FATEHPUR JAT
MOHIUDDINPUR
FATEHPUR GUJAR
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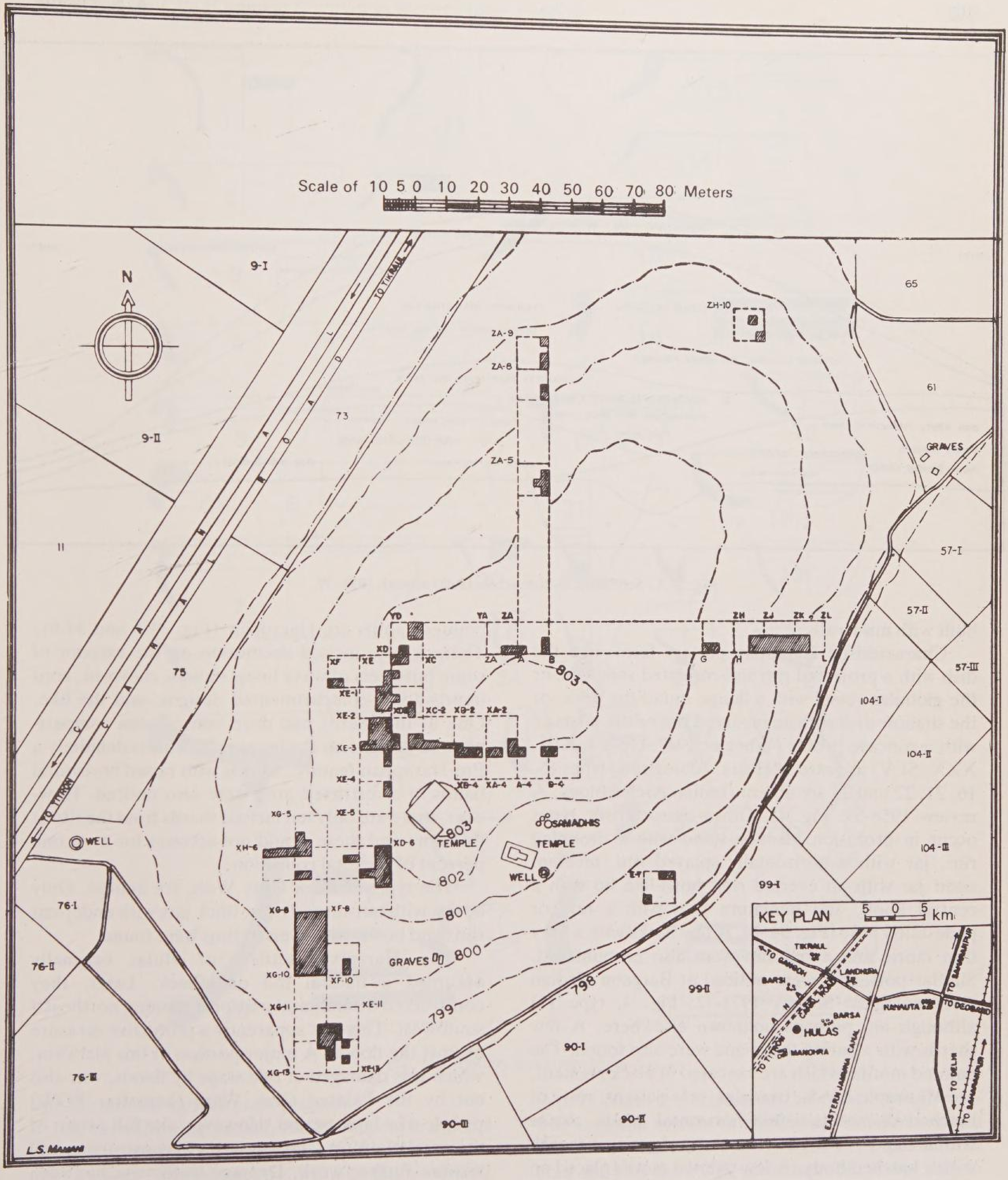
L.S. MAMANI
● Ancient cities
■ Modern towns

Fig. 34.1. Principal Harappan sites in the Ganga-Yamuna *Doab*.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CANAL ROAD
TO SAHARANPUR
NANAUTA
TO DEOBAND
BARSA
HULAS
MANOHRA
TO TITRON
EASTERN JAMUNA CANAL
TO DELHI
TO SAHARANPUR
L.S. MAMAN

Fig. 34.2. Site plan of Hulas 1978–79.

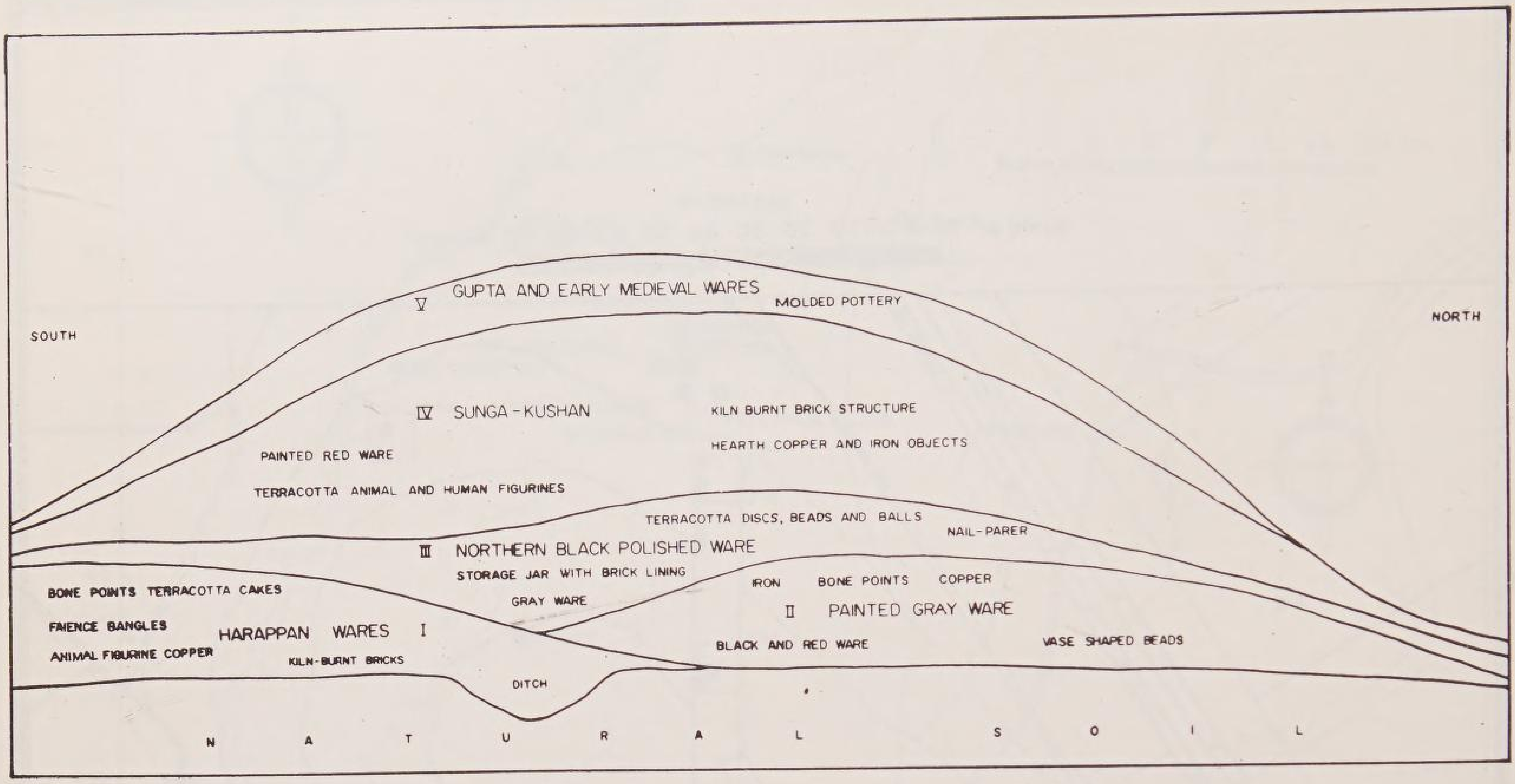
SOUTH
NORTH
V GUPTA AND EARLY MEDIEVAL WARES
MOLDED POTTERY
IV SUNGA-KUSHAN
KILN BURNT BRICK STRUCTURE
HEARTH COPPER AND IRON OBJECTS
PAINTED RED WARE
TERRACOTTA ANIMAL AND HUMAN FIGURINES
TERRACOTTA DISCS, BEADS AND BALLS
NAIL-PARER
III NORTHERN BLACK POLISHED WARE
STORAGE JAR WITH BRICK LINING
GRAY WARE
IRON
BONE POINTS
COPPER
II PAINTED GRAY WARE
BONE POINTS TERRACOTTA CAKES
FAIENCE BANGLES
HARAPPAN WARES I
ANIMAL FIGURINE COPPER
KILN-BURNT BRICKS
BLACK AND RED WARE
VASE SHAPED BEADS
DITCH
NATURAL SOIL

Fig. 34.3. Schematic section across Hulas mound, 1978–79.

built with mud walls.

Characteristic Harappan pottery forms like the dish with a projected rim and carinated shoulder, or the globular vessel with a flange round the neck, or the shallow dish with an incurved rim or the jarstand with a concave profile (Wheeler 1947: types I, XIII, XXX, SLV) are rare at Hulas. Alamgirpur types 15, 16, 21, 22 and 23 are absent (Indian Archaeology: A review 1958-59: Fig. 4). Other characteristic types occur in profusion: dish-on-stand with a drooping rim, jar with a horizontally splayed rim, medium sized jar with an everted rim, bowl-like lid with a central knob, and miniature pots with a ring or pedestaled base (Fig. 34.4). A few flasks with a very thin fabric and a red slip were also encountered. Similar potsherds were noticed at Bargaon (Indian Archaeological Society 1971-72: Fig. 4, type 11) although are perhaps unknown elsewhere. A few sherds with a paring technique were also found. The painted motifs, which are executed in black pigment, are all simple bands, triangles, mat designs, rows of hatched diamonds within horizontal bands, chains within bands, leaf patterns and a dancing peacock with a hatched body. A few painted motifs placed on the neck and shoulder seem to have been derived from the Pre-Harappan tradition. Still, a majority of painted motifs are Harappan (Fig. 34.5 and 34.6). There is also incised decoration on the exterior of some pots: sets of wavy lines, sigmas, chevrons, cord impressions, compartmented designs, and the like. One of the sherds had deep conspicuous compartmented designs on the inner side. This is definitely a Pre-Harappan feature. Sherds with raised horizontal bands in a restricted area were also noticed. However, there are only ten incised sherds from the site at this time and these would not account for even one percent of the total collection.

The types of thick Gray Ware are limited. Only basins with out-turned rims, thick jars with under-cut rims and bowls with everted rims were found.

The Harappan settlers of Hulas originally occupied a natural hill or hillock. Later, they constructed a solid mud platform running northeast/southwest. This was apparently a protective measure against the floods. A major portion of this platform, which was damaged at one stage by floods, was also cut by the Painted Gray Ware (hereafter PGW) people of a later period. However, the full extent of this mud platform, and its phases of construction will require further work. Damage to the site has been done in recent years by villagers who have completely removed a large portion of the southernmost part of

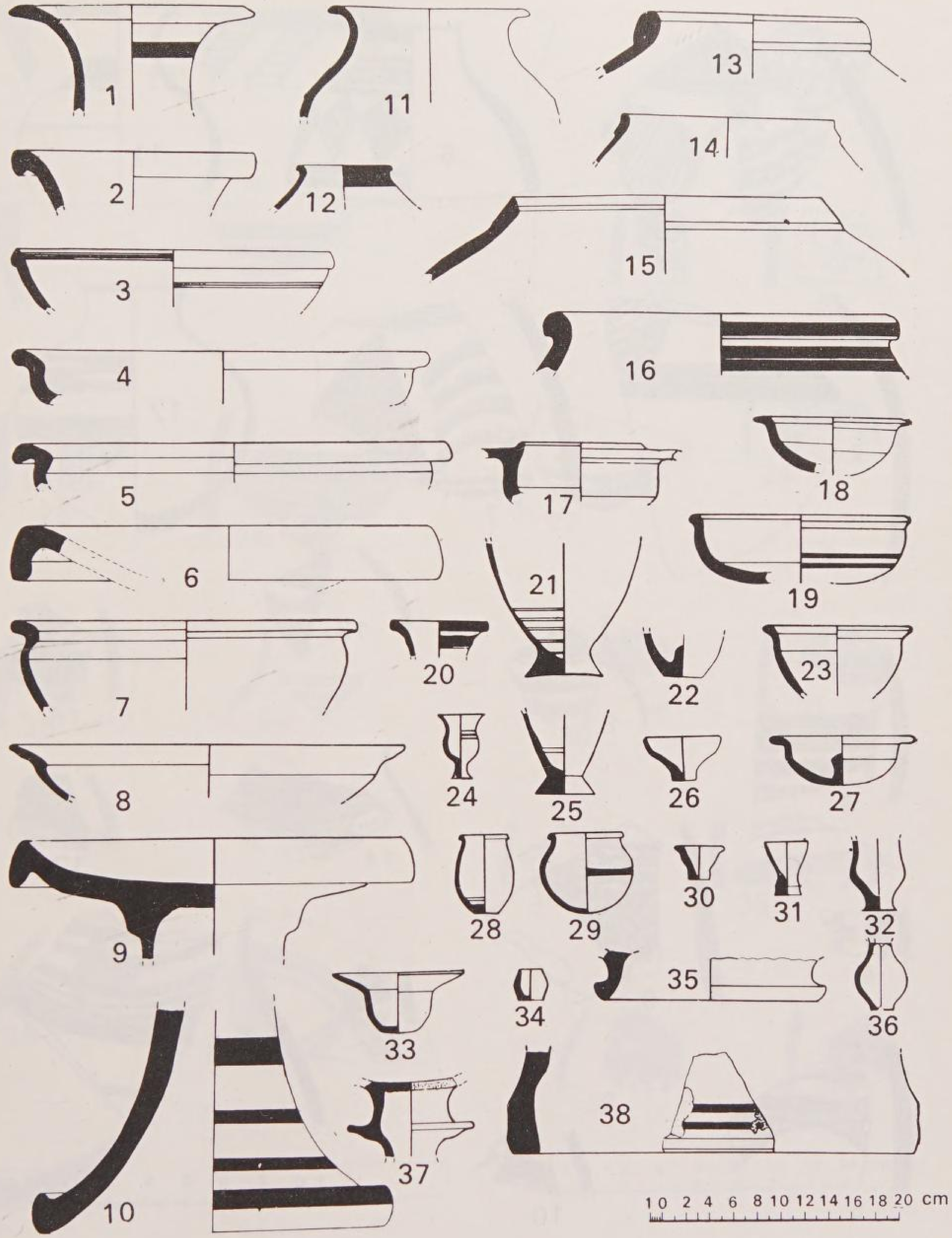
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Fig. 34.4. Pottery types from Hulas.

the mound for agricultural operations.

In the following period, the PGW people did not settle on the area once occupied by the Harappans. They instead settled on virgin soil to the north and east of the Harappan settlement. There is also a ditch or ancient rain gully, encountered at the depth of 4.3 meters from the surface of the trench lying somewhere in the middle of the mound and demarcating the two settlements. The NBP settlers expanded the area used by the PGW settlement but it was only in the Kushan times that the people occupied the area covered by both Harappans and makers of PGW.

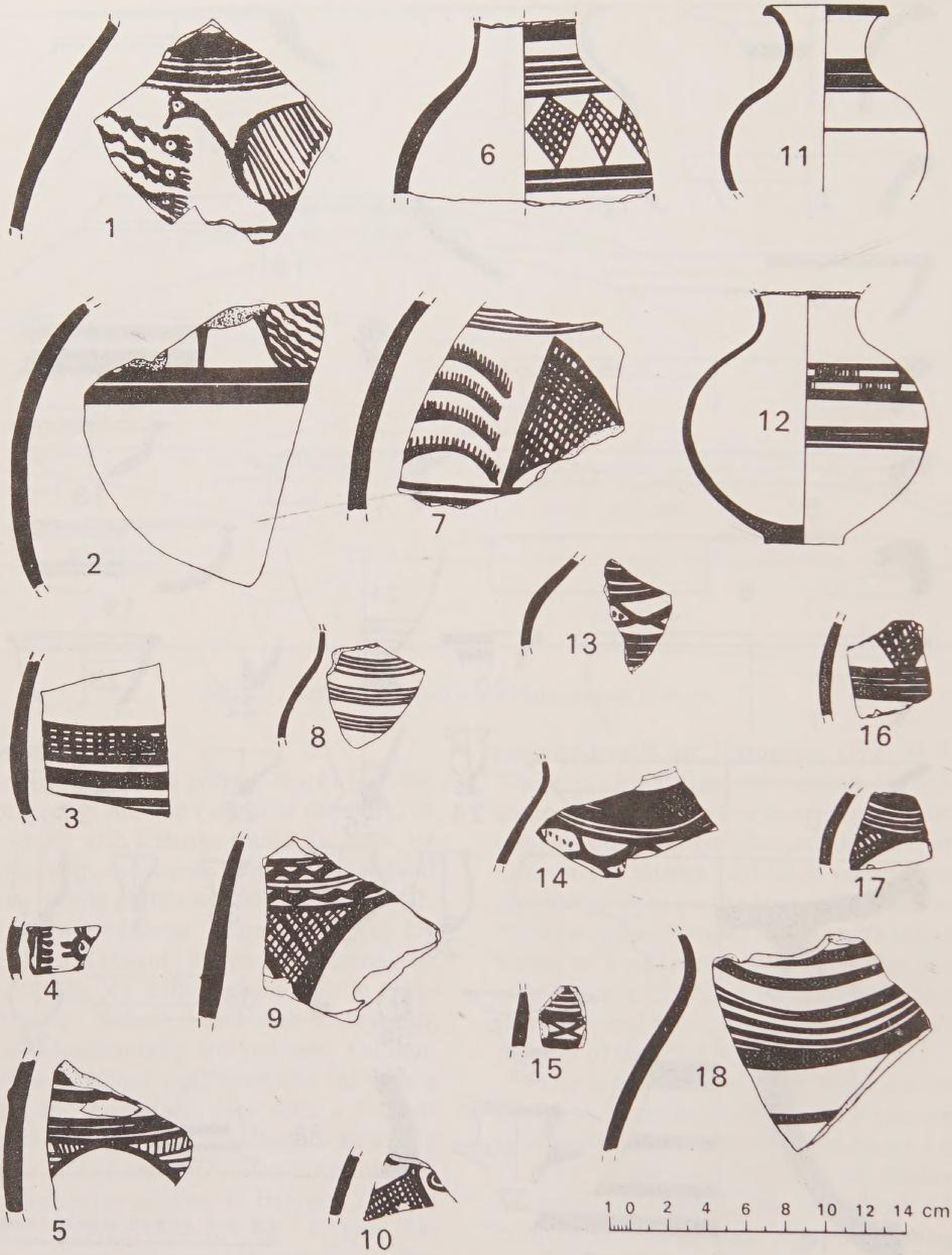

Fig. 34.5. Painted designs from Hulas.

This feature of the Harappan and PGW settlements at this site conforms to the situation observed in the Ghaggar Valley in northern Rajasthan and Haryana but differs from the Hindon River area (type site: Alamgirpur) and Sutlej Valley (type site: Ropar).

There is a ditch, or ancient rain gully, at a depth of 4.3 meters from the surface. This feature lies toward the middle of the mound and separates the Harappan and PGW areas. At approximately 90 centimeters deep it was possibly a significant barrier to the northward expansion of the Harappan settlement; but much more needs to be known about it. For example,

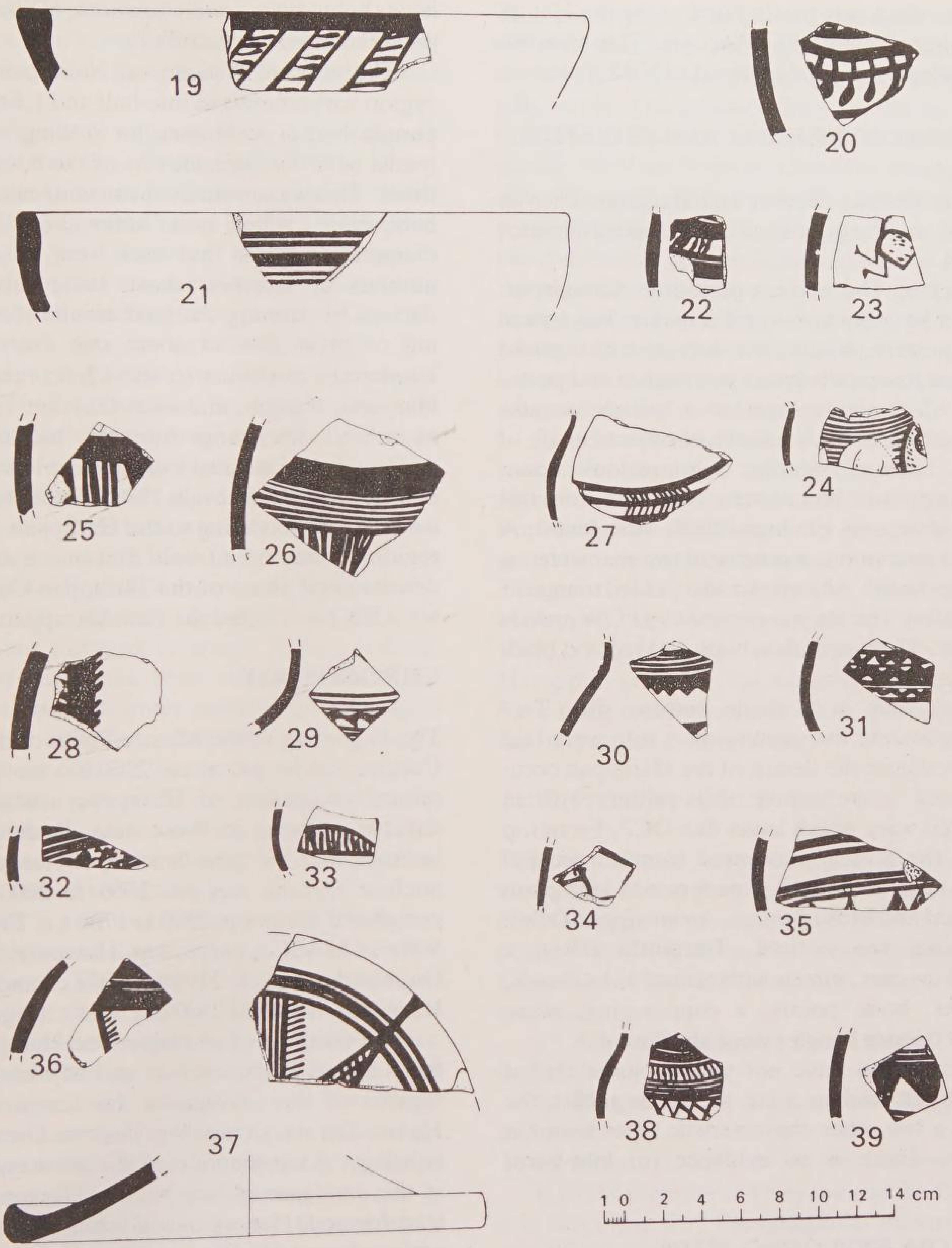

Fig. 34.6. Painted designs from Hulas.

the exact width of the ditch could not be ascertained this year; although it was observed in cross-section running for about five meters. The Harappan potsherds which were found in the bottom of the feature show a waterlogging effect and are like the Ochre Colored Ware encountered at other sites in the *Doab*. The slip is usually separated from the surface of these sherds. Dishes-on-stand, jars with splayed rims and miniature pots were found in the ditch. The sherds of successive periods, to NBP at a depth of 2.2 meters from the surface are very small, rolled and weathered. It thus appears that the area was unoccupied and that the ditch was partly filled up by the Harappans and altered by the PGW people. This area was further leveled by washed material of NBP times.

DATA FROM OTHER EXCAVATED SITES

Alamgirpur, District Meerut and Bargaon, District Saharanpur, are the only excavated Chalcolithic sites in the *Doab*.

Alamgirpur: The earliest period at Alamgirpur, represented by a thickness of 1.8 meters has typical Harappan pottery, notably the dish-on-stand, goblet with pointed base, cylindrical jar, beaker and perforated jar. Cloth impressions on a trough are also extremely interesting. A variety of objects made of terracotta, faience, steatite, semiprecious stone, bone, and copper or bronze were recovered from this level. Two groups of kiln-burnt brick were found. A short incised inscription, consisting of two characters on a trough, was found. Alamgirpur also yielded triangular terracotta cakes. The site was occupied by PGW makers after a break. They used plain black and red and black slipped wares.

Bargaon: This is a single culture site. Two trenches measuring five meters on a side were laid there to investigate the details of the Harappan occupation as well as the nature of its pottery with an unslipped red ware which looks like OCP. From top to bottom, the pottery recovered from an occupational thickness of about 1.2 meters was Harappan plain, painted and incised wares. An unslipped Ochre Colored Ware was noticed. Terracotta cakes, a bull headed toy cart, wheels with central hubs, beads, chert blades, bone points, a copper ring, stone weights and faience bangles were also found.

The excavations have not yielded some typical Harappan types, such as a jar, the Indus goblet, the beaker and a few other characteristic types found at Alamgirpur. There is no evidence for kiln-burnt brick.

DATA FROM EXPLORED SITES

There is a concentration of Harappan sites in District Saharanpur. These are confined to the tributaries of the Yamuna found in the districts of Saharanpur, Muzaffarnagar and Meerut (Dikshit 1970). But, there is not one site with all of the typical Harappan pottery in this area which is within the Ganges Valley proper. A few of the more important sites of this type have been discussed elsewhere (Dikshit *in* Deshpande in press: Appendix I).

The average thickness of Harappan strata in this region varies between one-half and 1.8 meters. These people had a preference for settling on steep river banks with the insecure silts of the flood plain below them. This was a source of constant catastrophe. The habitations, which cover areas about 200 meters in diameter, suggest that they were used by a small number of families whose basic subsistence was derived by farming the land around them. The spacing of these sites at about one every eight to 12 kilometers conforms to the Chalcolithic pattern in Haryana, Punjab, and even Gujarat. In Saurashtra, as in Sind, sites range from tiny hamlets to villages and towns and are also located close to banks of rivers and streams (Chitalwala 1978). Since there is neither a city nor town dating to the Harappan period in this region, it may be inferred that one is dealing with a deurbanized phase of the Harappan Culture. This is what has been called the Late Harappan.

CHRONOLOGY

The beginning of the Mature Phase of the Harappan Culture can be put at ca. 2350 B.C. on the basis of a critical evaluation of Harappan artifacts found in datable contexts in West Asia. Radiocarbon dates indicate that the time bracket of Harappan Culture nuclear regions was ca. 2300 to 2000 B.C. and in peripheral areas was 2200 to 1700 B.C. These dates are without MASCA correction. However, Surkotada in Gujarat dates to ca. 2100 to 1650 B.C., and Banawali in Haryana extends to 1400 or 1300 B.C. (Agrawal 1978).

The number of characteristic Harappan pottery types found in the nuclear and adjoining peripheral regions of this civilization are certainly limited at Hulas. The site chronology discussed here is based on typology. An evaluation of the latest types at Hulas, in the amalgam of late Mature Harappan, Late (or transformed) Harappan and forms of unknown origin with a legacy of Pre-, or Post-Harappan Cultures (e.g. Cemetery H) of the Indus proper, indicates that the date of this culture complex, including that found at Bargaon, can be suggested to have been ca. 1700 to 1000 B.C. The Harappans migrated to the Yamuna Valley through that of the Sutlej. This route was also possibly followed by the Post-Harappan Cultures of the Indus Valley, such as Cemetery H (Dikshit 1967). New pottery forms started appearing at Ropar, Bara, Bargaon, Alamgirpur and Hulas, while the traditional characteristic types lost their use, as the Harappan Culture in this region underwent a substantial transformation.

Y.D. Sharma once suggested a culture sequence for the Punjab that began with Kotla Nihang Khan, moved to Ropar and ended with Bara (Sharma 1964). He has recently suggested* that Ropar I (Harappan Period) has a predominance of Pre-Harappan, Harappan and cognate elements in different levels or areas. It can be divided into two phases (A and B) which combined date to ca. 2100-1400 B.C. The earliest settlers at Ropar lived on the northern edge of the mound. They were either Pre-Harappans, with contacts with the Harappans, or were a mixed community. A few pottery types are clearly of the Pre-Harappan Kalibangan type, or even exhibit an affinity with the Pre-Harappan pottery from Pre-defense Harappa, Amri, Kot Diji, Sarai Khola or Siswal. In Phase B, the Bara people occupied the eastern slope of the mound. They cohabited the place with Harappans (Sharma in press). Since no stratigraphic correlation has been made between the northern, eastern and center portions of the mound this sequence is difficult to deal with. But, Sharma's earlier treatment of Bara Ware, a late contemporary of the Harappan, appears to be valid. In fact, some pottery of unknown connections was always present in the Harappan complex; although its independent status always lacked recognition.

Since there is no overlap between the Harappan and PGW Cultures at Ropar the end date of ca. 1400 B.C. has been used. This was done because it would be difficult to push back the antiquity of PGW at Bhagwanpura to a date earlier than ca. 1200 B.C. since this would also be the date of the survival of the Bara Culture. At Nagar and Katpalon the pure Bara Phase is absent since even in the lowest levels there is an overlap between Bara and PGW Wares (Sharma in press). The excavation at Mitathal in Haryana is worth mentioning in this connection. This site has a cultural sequence from the late Pre-Harappan to the Late Harappan. Mitathal IIA is a Mature Harappan settlement with some Pre-Harappan pottery. Period II B is marked by a gradual decline in the material culture and is comparable to Daulatpur, Mirzapur, Bhagwanpura IA, Alamgirpur and Hulas. This period is dated to ca. 1700 to 1500 B.C. (Suraj Bhan 1973). This sequence is also found at Banawali which starts with Kalibangan I. The upper phase is predominantly Bara Ware recovered from pits cut through Harappan levels. The primary Bara habitation was to the east of the Mature Harappan settlement (Bisht in press). No Bara Ware was found in the early levels of the Harappan occupation at Banawali; although some Pre-Harappan (Kalibangan I or Sothi Complex) elements persisted throughout the period. It is not clear that the habitation area of the Bara Culture, as designated by the excavator, existed along with the Mature Harappan. If this is the case then Bara's history will begin much earlier than what is supposed when it is called Late Harappan.

The deurbanized Harappan Culture continued for some time on a few sites in Haryana and Punjab. Here it came into contact with the complexes of a Pre-Harappan (Kalibangan I) genre which had lingered in comparative isolation for several centuries. This gave rise to an amalgam of culture with distant Harappan and Pre-Harappan traditions (Thapar 1978). The influence of Cemetery H in the Late Harappan complex has recently been suggested to have been more of an echo than something substantial in terms of cultural traits.

THE THEORY OF OVERLAP

This hypothesis suggests three substages of the Harappan Culture within its Late Phase. These are: (1) Harappan pottery without PGW, (2) Harappan pottery with PGW, and (3) Harappan pottery with Gray Ware. The following sites are associated with each substage:

1) Ropar, Daulatpur, Kurukshetra, Alamgirpur and Hulas.

2) Bhagwanpura, Dadheri and Katpalon (Joshi in press).

3) Manda (Dikshit 1978; Joshi in press).

If PGW is earlier in Haryana and the Punjab, then it is not clear why the composite culture (Harappa and PGW) did not penetrate the Yamuna Valley. In western Uttar Pradesh and eastern Rajasthan there is a clear antecedent stage to PGW (i.e., the Black and Red Ware stage) but there is no such phase in Haryana and Punjab. At Dadheri and Katpalon, Harappan Ware has been reported to occur with Black and Red and Painted Gray Ware. It can therefore be argued that this kind of overlap between the Late Harappan and PGW was: (1) a localized phenomenon at a few sites in Haryana and Punjab, and (2) that it never penetrated the Yamuna Valley. If the chronology of Ropar is accepted then most of the sites in western Uttar Pradesh should be placed in the middle phase of Ropar (the Harappan of Bara tradition) which Sharma has designated Phase IB. Again, he feels that it is the Bara Culture which overlapped PGW.

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*Editor's note: See Dr. Sharma's paper in this volume for a full discussion of this issue.

I have developed two phases for the Harappan complex in western Uttar Pradesh: Phase I between ca. 1700 and 1300 B.C., and Phase II between 1300 and 1000 B.C. (Dikshit 1970). This scheme is based on the presence or absence of certain Harappan traits and is a tentative suggestion. Phase I is represented by sites like Alamgirpur, Bhura, Kalaheti, Tatarpur Kalan and Hulas. It is made up of typical Harappan pottery, carnelian beads, terracotta animal figurines, triangular cakes, stone objects and burnt bricks. The presence of inscribed pottery at Alamgirpur clearly proves that this phase is near the Urban Phase of the Harappan Culture. Phase II consists of the following sites: Bargaon, Pilkhani, Bahpur, Hardakheri, Bakarka, Gathera and Budha Khera. They have an unslipped red ware which looks like the so-called Ochre Colored Pottery (OCP) which clearly dominates the assemblage. The density of population in the second phase may have been comparatively high since there is an increase in the number of sites; however they appear to be on the average smaller than the earlier ones. Bargaon has some characteristic Harappan pottery, but there are no inscriptions. The assemblage also lacks triangular terracotta cakes and kiln-burnt bricks.

The Allchins have also suggested a two-phase scheme. The first of these is contemporary with a Late Harappan and the second is Post-Harappan (Allchin and Allchin 1968). But Possehl (1977) has equated Bargaon and Ambkheri with Alamgirpur and suggested the date of ca. 1900-1000 B.C. As outlined above, the cultural elements noticed at Alamgirpur are much closer to the Mature Harappan complex than to the Bargaon complex. Further, signs of contact with Ambkheri, essentially an OCP site in the Ganges Valley, suggests only typological affinity of certain ceramic types. It would be hasty to put OCP sites in the Post-Harappan times. The distribution of this ware in the upper and central Ganges Valley, eastern Rajasthan has revealed a different sequence (Dikshit 1978b). However, a fuller understanding of the material culture of this period will be known only when more sites have undergone horizontal excavations.

The evidence for the interrelationship between sites in Haryana, Punjab and Uttar Pradesh reveals the stages in which the Harappan Culture appeared in this homogenous belt. The cross current in the period immediately following the Mature Harappan in the area is still not clear in terms of a unilinear sequence; although the chronology proposed here appears to be substantially correct as far as major stages are concerned. No attempt has been made to correlate this picture with that for Gujarat and Saurashtra since the latter region is in a different environmental setting.

RADIOCARBON DATES

The Late Harappan sites in the Yamuna and Sutlej Valleys have not yet been dated by ^{14}C; although four dates ranging between ca. 1890 ± 95 and 1645 ± 90 B.C. have come from Bara (Sharma 1973). The earliest date (1890 ± 95 B.C.) is from midlevel (layer 9), at a depth of 2.2 meters. Surprisingly enough the other date (1280 ± 100 B.C.) is from layer 10 of the same trench at a depth of 2.5 meters below surface. These dates have obviously not helped in developing an accurate chronology.

DISCUSSION

The Pre-Harappan cultural horizon found in northern Rajasthan and Haryana is absent in western Uttar Pradesh; although Hulas has yielded a few painted and incised pots which may be from the Pre-Harappan tradition. Similar painted sherds have also been picked up from Tatarpur Kalan.

The Mature Harappan sites which are found in southern Sind, the Punjab (Pakistan), Bahawalpur, northern Rajasthan, Gujarat and Saurashtra are also not found in this peripheral region. Alamgirpur and Hulas represent a late Mature stage of Harappan Culture in western Uttar Pradesh. In fact it is the amalgamated tradition of Harappa-Bara which forms the base cultural stratum in the *Doab*. No influence of Cemetery H is noticed in this region. The next phase of this composite culture is again not found in Uttar Pradesh but it is present in Haryana and Punjab where sites with predominantly Bara Ware dominate the scene.

It may be pointed out that full impact of the Bara Culture was never felt in Uttar Pradesh. A legitimate question may be posed about the personality of the Bara Culture. Save for a few shapes and the decoration of pots with horizontal or wavy incised lines, the antecedents of this culture are not clear. There is, however, a diversity in slips and painting. Terracotta cakes and pointed goblets are rare in this complex (Indian Archaeology: A review 1954-55). In western Uttar Pradesh the incised elements or typical Bara designs are there, but always in very restricted number. It has been said that the end of Harappan settlements in the *Doab* created a cultural vacuum for a time (Fairservis 1971). But the present survey did not reveal this. In western Uttar Pradesh the Harappans gradually merged into the local culture identified as the Ochre Colored Pottery assemblage. The Unslipped Ware of the Yamuna Valley differs from the OCP of the Ganges Valley in texture. The latter is more powdery and the color sticks to the hand when a sherd is rubbed. The sites at Nahli and Malhera in District Meerut, and Manpur, Bhatpur and Lal Qila in District Bulandshahr belong to the Ganges Valley. The Ganges Valley OCP sherds are generally gray in the core although sherds with red core are also available.

The OCP sites in the Ganges Valley have a typological affinity with the Harappan in the Yamuna and Sutlej Valleys. The complex at Ambkheri consists of a variety of utilitarian pottery types, terracotta and carnelian beads, animal figurines and stone objects. The painted and incised sherds of Bara type noticed in the OCP complex of the central *Doab* are not present on any of the sites in the upper *Doab*. In the central *Doab*, at Atranjikhera and Saipai, a few incised designs, painted sherds and other pottery types occurring in small numbers (e.g., channel-like spout and handled pots) were noticed in the OCP complex. No Harappan type (e.g., dish-on-stand, jar stand, etc.) was encountered in this complex (Dikshit 1978b). The excavations at Noh, Jodhpura and Ganeshwar in eastern Rajasthan revealed an extension of the OCP Complex of the Central *Doab* through the tributaries of the Yamuna. The study of this material is important (Agrawala 1978). Work is in progress at Ganeshwar.

CONCLUSION

The archaeological evidence at Hulas has confirmed the diffusionary processes of the Harappan Culture which spread these people into the region where they developed local variation. The widespread degeneration or decay in this cultural traits or elements, noticed at Alamgirpur in Uttar Pradesh, Ropar and Sanghol in the Punjab and Mitathal and Banawali in Haryana, bear ample testimony to this fact. Contact with the parent culture in the Indus Valley seen in a few ceramic forms and designs and perhaps in the stray finds of stone weights, faience objects, terracotta cakes and animal figurines, suggests a close identity in terms of the spread and expansion of common systems and ideas. The absence of inscribed seals, and the general scarcity of copper, bronze and other raw materials, such as chert, lapis lazuli and gold, shows that there was a severe setback to internal and external trade. The presence of some Bara Ware in the Harappan complex provides evidence for interregional contacts between the Punjab and Uttar Pradesh; although the vigorous and vivid impact of the Bara Culture was never felt in the *Doab*.

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S.R. RAO

35. New Light on the Post-Urban (Late Harappan) Phase of the Indus Civilization in India

IT IS now generally agreed that the Indus Civilization did not die a sudden death with the destruction of Harappa and Mohenjodaro in ca. 1900 B.C., but survived for three centuries more outside the Indus Valley.

The causes for the destruction and consequent abandonment of most of the Mature Harappan settlements, both urban and rural, in Kutch, Saurashtra and South Gujarat have been discussed in *Lothal and the Indus Civilization* (Rao 1973). Subsequent to the publication of this work a few more Mature Harappan sites and a large number of degenerate, or Late Harappan sites were discovered in Gujarat, Rajasthan, Punjab, Haryana and Maharashtra. Some of them have been excavated.

This paper is based on a region by region study of the archaeological evidence from: (1) Kutch, (2) Saurashtra, (3) Gujarat, (4) northern Deccan, (5) Haryana and Punjab, (6) Rajasthan, (7) Jammu and Kashmir, and (8) western Uttar Pradesh. Late Harappan settlements chosen for study are classified into two groups:

Group I: Mature Harappan settlements which continued to be occupied in the Post-Urban, (i.e, Late Harappan) Phase:

Lothal, Rangpur, Atkot (Adkot), Bhela in Saurashtra; Desalpur, Pabumath, Dhola Vira (Kotada), Netra Khirsara, and Surkotada (Surkotda) in Kutch; Bhagatrav in South Gujarat; Siswal, Mitathal, Banawali, Hulas, Ropar (Rupar), Katpalon and Dadheri in Haryana-Punjab and Manda near Jammu.

Group II: Late Harappan settlements without an antecedent Mature Harappan phase:

Prabhas, Kindarkhera (Kinnarkheda), Rojdi, Devaliyo, Babarkot, Gop, Beyt Dwarka, Amra and Lakhabawal in Saurashtra; Kana Sutaria, Zekda, Kanewal and Mehgam in North Gujarat; Luna, Kotada-Bhadli and Todio in Kutch; Bhyana, Hingoni Bhudruk and Daimabad in the Tapti-Godavari Valleys; Alamgirpur in Uttar Pradesh; Mirzapur, Bara and Katpalon in Haryana-Punjab and Kayatha in Malwa.

In order to follow the process of the deurbanization of the Harappan Civilization, it is necessary to examine, in the first instance, whether it was an urban civilization at all. Trade, planning, literacy and established civic administration are some of the distinguishing features of urbanization. The Harappan cities show a capacity to have a wide habitational spectrum. Lothal had a population of 15,000 (Rao 1973: 53),[1] Mohenjodaro 33,469 (Datta 1962), and Harappa 37,155 (Datta 1962) and in each city the municipal administration was efficient, and civil discipline was firmly established. The cities were well planned as can be seen from the neatly laid streets; although all of them may not be to a gridiron plan. In one respect Lothal appears to be better planned than Mohenjodaro. The streets at Lothal are straight and are consistently run in cardinal directions: Street 2, Street 3, Steet 4, Street 6 and Street 9 run east-west; while Street 1, Street 5, and Street 8 and some lanes which lie in the north-south direction join the former at right angles. All the Harappan cities, and quite a few towns and villages, were fortified against flood. Some difference is noticed in the plans of granaries and in the location of cemeteries, but the overall picture is one of regimentation to some degree.

Another feature of urbanization is organized trade. If the number of seals/sealings found in Harappan settlements is taken as an index to the volume of trade, Mohenjodaro, Harappa, Lothal and Kalibangan can be placed in a descending order in this matter.

Lothal has yielded 213 seals/sealings and Kalibangan 65. While Mohenjodaro and Lothal reveal special skills like bead making, shell working, ivory carving, metallurgy, no such specialization is seen at Kalibangan. Though smaller in size than Kalibangan, Chanhudaro developed a bead making industry. The importance of Harappa lies in the volume of trade and not in developing any particular industry.

Extensive trade, internal as well as external, necessitated the introduction of uniform weights and production of goods to a uniform standard throughout the Indus Empire. The enforcement of trade regulations resulted in the extension of political control over the provinces and villages. With a centralized administration the distribution of goods and planning of towns and cities conforming to a general pattern became easy.

TERMINOLOGY

The decline in the material prosperity of the people as a result of a sudden stop in long-distance trade and a steep fall in internal trade cutting off the supply of essential raw materials required by specialized craftsmen is conspicuous in the Post-Urban Phase of the Harappan Civilization to which the name "Late Harappan" was first given (Rao 1963: 15; 1973: 60). This term has gained currency and is widely used in almost all publications by archaeologists in India and abroad. The diagnostic features of the "Late Harappan Culture" highlighted at Lothal and Rangpur, can be traced in similar situations at nearly 200 sites in Gujarat, 152 sites in Haryana-Punjab (India) and 25 sites in the Bahawalpur district of Pakistan. The term "Late Harappan Culture" or "Late Harappan Phase," as modified by some writers, is used in a cultural, not a chronological sense. It implies the phase immediately following the destruction of the urban centers of the Harappan Civilization when the process of deurbanization had begun in the regions east and south of the Indus Valley, to which the Harappan refugees came to occupy in large numbers. The connotation of the term "Late Harappan" encompasses the entire gamut of the decadent culture and not merely its ceramic wares. With this explanation in mind one may examine what deurbanization meant to the Late Harappans.

Deurbanization is often taken to mean the total reversal of the forces operating in urban life. True, there would be a smaller population, fewer civic amenities, a diminished volume of trade, although not a total stoppage of transactions, and fewer industries; but this need not imply a total reversal of cultural values, and much less a sinking into illiteracy and complete backwardness. To deserve the term "Late Harappan" it is essential that the inhabitants of the deurbanized phase must have retained the core of Harappan achievements such as writing, use of the Harappan standard of weights and Harappan religious beliefs including the method of the disposal of the dead. A particular craft or industry might die or decline and there would be fewer material comforts, but certain old values would be retained. After the initial decline there would be a slow rate of growth or recovery which can be further accelerated. The stage of decline is identified as "Late Harappan" at Rangpur and Lothal. The stage of slow recovery is called the "Transition Phase." Accelerated change in the context of the Harappan Culture, resulting in a new culture, is designed the "Lustrous Red Ware Culture," in Gujarat. It was a failure to distinguish these stages at Rangpur that had led earlier excavators to confuse the Harappan Civilization with an evolved culture. That part of the Rangpur mound where the Mature Harappans lived for a long time was not uncovered prior to 1953. When excavated, four structural phases of the Mature Harappan Culture (Rangpur IIA), which is distinguishable from the degenerate and immediately succeeding phase (Rangpur IIB), came to light.

In summarizing the distinguishing features of the Late Harappan Culture of Rangpur (Period IIB) the following observations made in 1963 should hold good in other cases too.

> The fabric of the ceramic wares of Period IIB is found to be coarse. In some cases the surface of the vessels is not rendered smooth and the paintings are indifferent. But it must be noted that there is no major change in the forms of the vessels themselves except in the convex-sided bowl. Certain types of vessels such as the beaker and goblet which were scarce in the preceding period were almost completely discarded. Only a couple of sherds of each type are found in Period IIB levels. The small jar and basin become less popular, but the heavy rimmed jar, dish-on-stand and bowl continue to be in demand.

The bowl with straight sides and a thick rim also came into use in Period IIB. Besides the poorer fabric of the earthenware as a whole and the discarding of certain types of vessels, there are other indications of the decline in the prosperity of the Harappans. The utter scarcity of steatite ornaments, cylindrical carnelian beads, cubical (hexahedron) stone weights and chert flakes, all of which used to be imported in Period IIA, shows that the inhabitants could not do so in Period IIB. Owing to their adverse economic conditions the inhabitants could not build comfortable houses—not even the mud-bricks were used for building houses. No drains and baths were built. This decadent phase of the Harappa Culture lasting for about 200 years (revised date—1900-1700 B.C.) after the destruction of the first township of the Harappan settlers at Rangpur is represented by a deposit of more than 3 metres in RGP 2 and RGP 5 (Rao 1963: 15-16).

At Lothal two ^{14}C dates for the early and middle levels of Period B are available. The ^{14}C samples TF-19 and TF-23 from Structural Phase VA are dated 1865±110 B.C. and 1800±145 B.C. respectively, but none are available for the upper levels of VA and VB. The lower limit of Phase VA is fixed at 1700 B.C. and that of Phase VB at 1600 B.C. when further changes in ceramic forms and the decoration of the vessel surface by painting wavy lines, fronds and loops took place. Lothal Period B is equated to Rangpur IIB and IIC. Strictly speaking, the presence of a number of evolved pottery types should be distinguished as a subphase in Lothal B.

During the Late Harappan Phase at Lothal the continuity of Harappan traditions such as bathing (as indicated by jerry-built baths and drains), fire worship and burying the dead can be seen. The Harappan tools and ornaments (i.e., copper celts and bangles) continued to be in use, although in very limited numbers. The quality of ceramic production suffered, but most of the Harappan pot shapes survived. Even the Harappan standard of weight, in very limited use in the Mature Phase, continued to be used, although the cubical, hexahedron, was replaced. The technique of producing beads and blades did not change, but the locally available chalcedony was substituted for imported chert. The extended burials of Phase V at Lothal, and those of Daimabad, confirm that the Late Harappans continued to follow the Harappan practice in disposing of the dead. The decline in trade drastically reduced the utility of seals; but writing did continue.

WEIGHTS

Recent investigations into the weight standard of Late Harappan sites has thrown welcome light on the continuity of Harappan traditions. The hexahedron (cubical) chert weights of the Urban Phase run in the ratio 1 : 2 : 4 : 6 : 8 : 16 : 32 : 64 etc. This Indus standard was used in almost all Harappan towns, including Lothal and Rangpur; but it was confined to the Mature Phase. There was, however, another type of weight, here called the "truncated spheroid." These were generally of agate, chert or dolerite in the Mature Harappan Phase at Lothal. This type continued to be used in the Late Harappan levels of Lothal, as well as Rangpur, but only in dolerite or sandstone.

It would be of interest to know whether the weight standard indicated by truncated spheroids of the Late Harappan Phase corresponds to the standard of hexahedrons in the Mature Harappan Phase. The smallest weight in one group of hexahedrons weighs 4.337 grams. The one next to it weighs 8.5733 grams, corresponding to the shekel (8.37 grams) in the Babylonian system, which was in vogue at Susa. The truncated spheroids of Lothal weigh 98.2 grams; 156 grams; 229.5 grams; 271.2 grams; 275.2 grams; 280 grams; and 300 grams. To find the standard underlying this series one has to turn to the hexahedrons weighing 8.5753 grams. Taking into account all the hexahedrons of the Late Harappan and Transition Phases, along with those of Rangpur, the following ratios are arrived at:

Unit:	8.5753 × 3/2	=	12.8629 gm	=	12.767 gm	(RGP III)
	8.5753 × 3	=	25.7259 gm	=	26.611 gm	(RGP IIC)
	8.5753 × 6	=	50.4518 gm	=	48.766 gm	(RGP IIC)
	8.5753 × 7	=	60.0271 gm	=	58.126 gm	(RGP IIC)
	8.5753 × 12	=	102.9036 gm	=	98.2 gm	(Lothal B)
	8.5753 × 18	=	154.3554 gm	=	156.0 gm	(Lothal B)
	8.5753 × 32	=	274.4096 gm	=	$\frac{271.2 + 275.2}{2}$	(Lothal B)
				=	273.2	

The ratio 1 : 3/2 : 3 : 6 : 12 : 18 : 32 is thus obtained. There is one example which is seven times the unit. It is thus evident that the truncated spheroid weights which were in use in the Mature Harappan Phase continued to be used in the deurbanized phase and later. Truncated spheroids found in other sites might not have been recognized as weights and not reported. It is worth examining all such stone objects from the point of view of ascertaining the weight standard of the Late Harappan Phase outside Gujarat.

RELIGION

Continuity of Harappan religious practices in the Late Harappan Phase is indicated by certain altars built in Lothal B, Rangpur IIC and Daimabad.

METALLURGY

One of the distinguishing features of the Mature Phase of the Harappan Civilization is the plentiful use of copper and bronze. Even in a small village like Allahdino copper was used in plenty. In the Late Harappan Phase copper became scarce; but the technology did not suffer. The tool types remained the same. A glance at some of the copper objects from Rangpur IIB, IIC and Lothal B gives a clue to the continuity of the Harappan tradition.

Rangpur IIB

1. Copper pin with a rolled head 96.6 percent copper; 0.8 percent nickel, 1.86 percent iron.

Rangpur IIC

1. Copper celt: 91.2 percent copper, 2.6 percent tin, 2.1 percent nickel
2. Bronze knife: 59 percent copper, 5.28 percent tin
3. Copper knife: 94.8 percent copper, 0.7 percent tin, 0.4 percent nickel
4. Bronze bangle: 86.4 percent copper, 11.07 percent tin, 1.8 percent nickel

Lothal B

1. Shaft balance: 88.27 percent copper, 0.19 percent nickel; no tin
2. Transverse axe: 94.33 percent copper, nickel traces; no tin
3. Axe with a short broad blade: 70 percent copper; no tin
4. Lunate shaped blade (not analyzed)
5. Awl with a round section (not analyzed)
6. Nail with a square section (not analyzed)
7. Hook with a round section (perhaps a fish hook) of which barb loop and shank are damaged (not analyzed)
8. Bangle with overlapping ends (not analyzed)
9. Ring: 63.58 percent copper, iron traces
10. Ring coiled in three spirals made from a flat strap
11. Figurine of a fowl (cock) with a prominent crown and a short pointed beak (not analyzed)

Lothal Period B yielded a total of 102 copper objects or its alloy. Most of them are too fragmentary to be identified as tools or ornaments. Of particular significance is a smithy of Period B situated at the northern end of the town, where a number of copper smiths worked under a single roof. Five brick-skirted pavements, each with a pot furnace associated with it, were built in the smithy for cooling the metal. Among new tools produced by the smith mention may be made of the shaft balance, transverse axe and awl. Flat celts of Harappan type continued to be produced by the Late Harappans at Lothal, Rangpur, Somnath and Rojdi. On the whole it can be said that metal technology did not suffer in quality, though the number of tools and ornaments produced declined steeply.

TRADE AND INDUSTRY IN THE LATE HARAPPAN PHASE

Two major industries, namely bead making which catered to the foreign market and metal working which catered to the domestic market, were organized on a fairly large scale in the last days of the Mature Harappan Phase. For example, several lapidaries lived and worked under a single roof in Phase IV (Lothal A). They seem to have depended on the merchant/manager for a supply of raw material and the marketing of the finished product. In Phase V (Lothal B) the coppersmiths depended on a middleman for the supply of metals and marketing of goods. The initiative which lay with the individual craftsman to sell goods was lost in the Late Harappan Phase, as long-distance trade declined.

Owing to deurbanization the craftsmen had to move to distant places where their skill was in demand or where raw material could be easily obtained. A wider dispersal of industries is thus the hallmark of the Late Harappan Period, in contrast to the concentration of several industries (e.g., ivory and shell working, bead making, seal cutting, copper working and blade making) at Lothal and Mohenjodaro in earlier days. The shell workers moved to Amra and Lakhabawal at the northern tip of the Kathiawad peninsula and the copper workers moved towards the Debari mines near Ahar and perhaps to the Godavari Valley. The bead makers moved to Mehgam and Bhagatrav which are near agate beds, though some might have gone to Kayatha in Madhya Pradesh.

When the supply of fine grained chert needed for making long blades was stopped, the craftsmen used the chalcedony available in Kathiawad. The blades produced from this material were necessarily shorter in size; but the production technique remained the same as in the Mature Harappan Phase. It is only in Maski that one finds the use of long chert blades by the Chalcolithic folk who had contact with the Late Harappan craftsmen. It is not unlikely that some steatite bead makers moved in the Late Harappan Phase to Zekda in North Gujarat and as far south as the Ramavaram in Kurnool district. The wafer steatite beads of Harappan origin are found in large numbers here. The copper deposits of Tintini and Koppal in Raichur District of Karnataka appear to have been worked during the Late Harappan Phase (Rao 1978a; 1978b). Harappan chert blades and steatite beads occur at the nearby Chalcolithic site at Maski.

With the cessation of long-distance trade, seals served no real purpose. A few continued to be in use for a very short time at Lothal in Period B. Two specimens found at Daimabad seem to be curios only; but writing did continue.

CERAMIC INDUSTRY

As far as the ceramic industry is concerned the Red Ware of the Late Phase is of inferior fabric with an indifferently painted surface. The painting consists of elementary forms like horizontal bands, wavy lines, etc. But two Late Harappan sites deserve special mention. Venivadar (Vaniavadar) in Amreli District of Saurashtra was a small village producing a great deal of painted pottery in the coarser ware. Atkot in Central Saurashtra was a larger settlement of the last days of Mature Harappan Culture which continued to produce painted pottery in the Late Harappan and Transition Phases; but the painting was executed on a very limited surface of the vessels. A few Harappan motifs such as fish and bird did survive.

The contention that the Late Harappan Culture hardly touched Kutch (Soundara Rajan in press) is not correct. Six Late Harappan sites have been identified so far in Kutch. Quite a few are in the interior.

In the Sutlej Valley, out of 81 Harappan sites, only four or five belong to the Mature Harappan and the rest to the Late Harappan; but it is necessary to distinguish a subphase of evolved Harappan ceramic forms within the Late Harappan Phase. Harappan settlements at Manda and Ropar (Rupar) continued to survive into Late Harappan times also. Neither the Cemetery H Ware nor the Bara Ware is found at Manda, but both are said to occur at Bhagwanpura. There is, however, no substantial Late Harappan ceramic ware at all there. Owing to the disturbed condition of the site the so-called overlap of the Late Harappan Ware and Painted Gray Ware is not beyond doubt. A fresh excavation is, therefore, essential to confirm an overlap.

In Haryana the position is slightly different. Suraj Bhan (in press) has used the term "Late Harappan" for a culture complex resulting from the synthesis of Harappan and Late Siswal, since the evolved ceramic types of both the cultures occur together.

The Late Harappan Culture of Gujarat denotes the dominance of Harappan elements minus the urban discipline, architecture and sophistication in decorating earthenwares; but more than 75 per cent of the ceramic types in these sites is Harappan. The fabric is, however, poor. At Lothal, Rangpur and Rojdi, Micaceous Red Ware types occur in small quantities in the Late Harappan context. On the contrary, in a majority of the sites designated as "Late Harappan" in Haryana, the Siswal element is dominant and the Late Harappan Ware is meager. Hence it is desirable to distinguish those sites in which elements of other cultures (e.g., Mitathal IIB) are dominant and the Late Harappan element is much less, from sites in which the Late Harappan ceramic ware is dominant. The latter may be designated "Late Harappan" and the former as those "having Late Harappan contact." The reason for much of the Harappan tradition disappearing early in the Sutlej Valley and upper Yamuna may be that the Late Harappans encountered a strong non-Harappan folk in the Siswal culture; unlike Gujarat where their immediate ancestors had lived for a long time. The indigenous folk in Gujarat had themselves taken much that was Harappan.

The rate of degeneration and subsequent resurgence varied from region to region. In the relatively isolated regions like Saurashtra and Kutch, the Late Harappans retained the Harappan tradition for long; but in Haryana and Punjab they had to compromise with the Siswal tradition, and as they moved further east and north, they retained hardly anything that could be called Harappan or Late Harappan, as seen at Bahadarabad, Bhagwanpura, to name two places.

CONCLUSION

In the final analysis one finds that the administrative machinery and civic amenities of the Mature Harappan were lost, but some architectural features like building drains and platforms survived in the Late Harappan Phase. Highly organized trade suffered heavily; but the more important trade mechanism, namely weights, did survive. Although seals had a short life the more essential feature of an enlightened society, that is writing, not only survived but was also improved upon. Metallurgy suffered in quantity, but not in quality. Figurines were cast as before and a better tool type, such as the shaft hole axe, was added to the tool kit. Harappan social customs and religious beliefs also survived. The dead were buried as before and altars for fire worship were constructed. As the "Śiva-Mahadeva concept" and "Linga worship" are only imaginary (Dales in press) they do not find any place in the Late Harappan Phase. The worship of the Mother Goddess, which was limited to the Indus Valley even during the Urban Phase, ceased to be of any significance in the Late Harappan Phase everywhere. As far as ornaments were concerned, steatite beads were replaced by faience beads and terracotta bangles by shell bangles; but the love of personal ornaments did not diminish in the Late Harappan Phase. Precious metal was not, however, available in adequate quantity.

Finally, it must be admitted that the decline was not uniform in different regions. If the Late Harappan sites in Rajasthan, Haryana, Punjab, Jammu and Kashmir and Western Uttar Pradesh are classified on the lines of the Subperiods IIB-IIC of Rangpur it would be easier to follow the diffusionary process of the Late Harappan Culture. The duration of the Late Harappan Phase in Kutch, Rajasthan, Haryana, Punjab, Jammu and Kashmir was shorter than in Saurashtra and North Gujarat. In the northern and northwestern zones there is a mixture with other indigenous cultures, such as the Siswal or Gray Ware (Plain), which were more virile than those in Saurashtra. This accounts for the Late Harappans losing their identity sooner in the north than in the south.

NOTE

[1] In assessing the Lothal population at 10,000 Dilip K. Chakrabarti has not taken into account the full habitation area of 1100 by 1000 feet, nor the per house population at five (Chakrabarti 1979: 210).

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M.K. DHAVALIKAR

36. Daimabad Bronzes

THIS discovery of the Daimabad bronzes (Pls. 36.1 to 36.5) though momentous has caused considerable controversy among archaeologists. They were the subject of heated debate during the seminar on the "Indus Civilization: Problems and Issues," organized by the Indian Institute of Advanced Study, Simla, November 1977. M.N. Deshpande then Director General of the Archaeological Survey of India, referred to these objects in his inaugural address and S.A. Sali, the excavator of Daimabad, also discussed them in the course of the deliberations of the seminar (Sali in press). S.R. Rao, who preceded Sali at the renewed Daimabad excavations, has also published his views (Rao 1978). All these authorities are of the view that the bronzes belong to the Late Harappan times, but this opinion appears to be based on the circumstantial evidence. At the Simla seminar this dating was questioned. Some scholars feel that the bronzes are tribal in origin, and as such may be as late as the 18th century A.D. Recently, D.P. Agrawal and his team have analyzed the elemental composition of the bronzes using atomic absorption spectrophotometry and have concluded that "We would not be surprised if these images turned out to be of the historical period" (Agrawal, Krishnamurthy and Kusumgar 1978: 45). His argument is based on the negative evidence that "no arsenical alloying has been reported from the Chalcolithic Cultures so far, but these Daimabad bronzes show greater than 1 percent arsenic.... It may also be pointed out that the Chalcolithic Cultures are very poor in copper and such massive figures appear completely out of place in the Chalcolithic context" (Agrawal, Krishnamurthy and Kusumgar 1978: 45). The exquisite hoard is thus hanging in a sort of chronological vacuum between the 18th century B.C. and the 18th century A.D. I therefore propose to examine the stylistic and technological aspects of the bronzes, as well as investigate their probable function, in order to establish their antiquity and authorship.

Before beginning the discussion of the authorship and the antiquity of bronzes some note of the objects in the hoard and the circumstances of their discovery is called for. The bronzes were found at Daimabad (District Ahmednagar, Maharashtra), an extensive Chalcolithic site located on the left bank of Pravara River, a tributary to the Godavari. The site was first excavated on a small scale in 1959 by M.N. Deshpande (Indian Archaeology: A review 1958-59; Dhavalikar 1969-70) and has been worked on a large scale since 1974 by S.A. Sali (Sali in press). It is a purely Chalcolithic site which, as the recent excavations show, was first occupied about 2000 B.C. and was finally deserted by 1000 B.C. after which it was never reoccupied.

The hoard consists of four bronzes: an exquisite chariot pulled by a pair of bulls, an elephant, a rhinoceros and a buffalo. They are all in an excellent state of preservation and have not lost their pristine features.

CHARIOT AND BULLS (Pls. 36.1 and 36.2)

The chariot and bulls are the most remarkable pieces in the hoard. Its total length is 45 centimeters and the width is 16 centimeters. The complete bronze consists of an elaborate chariot yoked to two bulls and driven by a man standing within it. Two solid wheels rest

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*Editor's note: See S. A. Sali's paper in this volume for a review of Daimabad.

over the light body of the chariot. The wheels have a projecting hub on the inner side in which the axle is fixed so that it moves along with the wheels. This is an extremely interesting feature which will be discussed later.

The vehicle, because of its light construction, looks more like a Roman *biga* than a cart and justifies its classification as a chariot. It has a front guard composed of two vertical curved bars with out-turned upper ends, whereas the lower ends are attached to a horizontal bar which, in its turn, has two ring loops for the axle. The guard also has two horizontal bars fixed to it. Of these, the upper one is straight while the lower one is angular. The guard is further strengthened by two oblique bars, the upper ends of which are attached to the top of the vertical bars with the lower ends joined. They are soldered together in a dog on the central pole, just in front of the guard.

The platform on which the guard rises is a truncated oval, on either side of which is a bird which merges with the chariot body. The two birds do, however, face in opposite directions. They are related to Harappan terracotta bird whistles.

The man driving the chariot is 16 centimeters high and stands on the platform. His left hand rests over the upper horizontal bar of the guard while the right hand holds a long stick curved at its upper end. The man is portrayed realistically. His physiognomy indicates that he is probably a Proto-Australoid (Pl. 35.2). To a great extent he resembles stylistically the terracotta head of a man from Kalibangan which, according to B.B. Lal, resembles the head of the famous limestone priest from Mohenjodaro (Lal 1979: 89, Pl. XXIV). He has a broad, snubbed nose with wide nostrils. His lower lip is thick and protruding. The curly hair, indicated by incised lines, is parted in the middle and is gathered at the back in an elongated roll. His body is neither muscular nor proportionate. The chest and the belly are somewhat elongated and the hips appear rather steatopygous. This latter feature is a physical trait which is also noticed on the man painted on a Malwa jar from Daimabad (Indian Archaeology: A review 1958-59: Fig. 8) (Fig. 36.1). The chariot rider does not appear to be wearing a lower garment but a vertical projection on the abdomen, resembling a hooded cobra, may be some part of the clothing. This projection is broken at the lower end and is difficult to identify with certainty.

The chariot has an inordinately long (32 centimeters) central pole which rises in a curve from the bottom of the chariot. The pole has curved vertical bars near its far end in which the necks of the bulls are accommodated. The bulls are not fixed to the yoking pole but can be removed. It may be noted that modern carts in Sind also have an inordinately long pole, but high bent poles seem to be a peculiarity of Sumerian chariots (Mackay 1929; 28, Figs. 1 and 2).

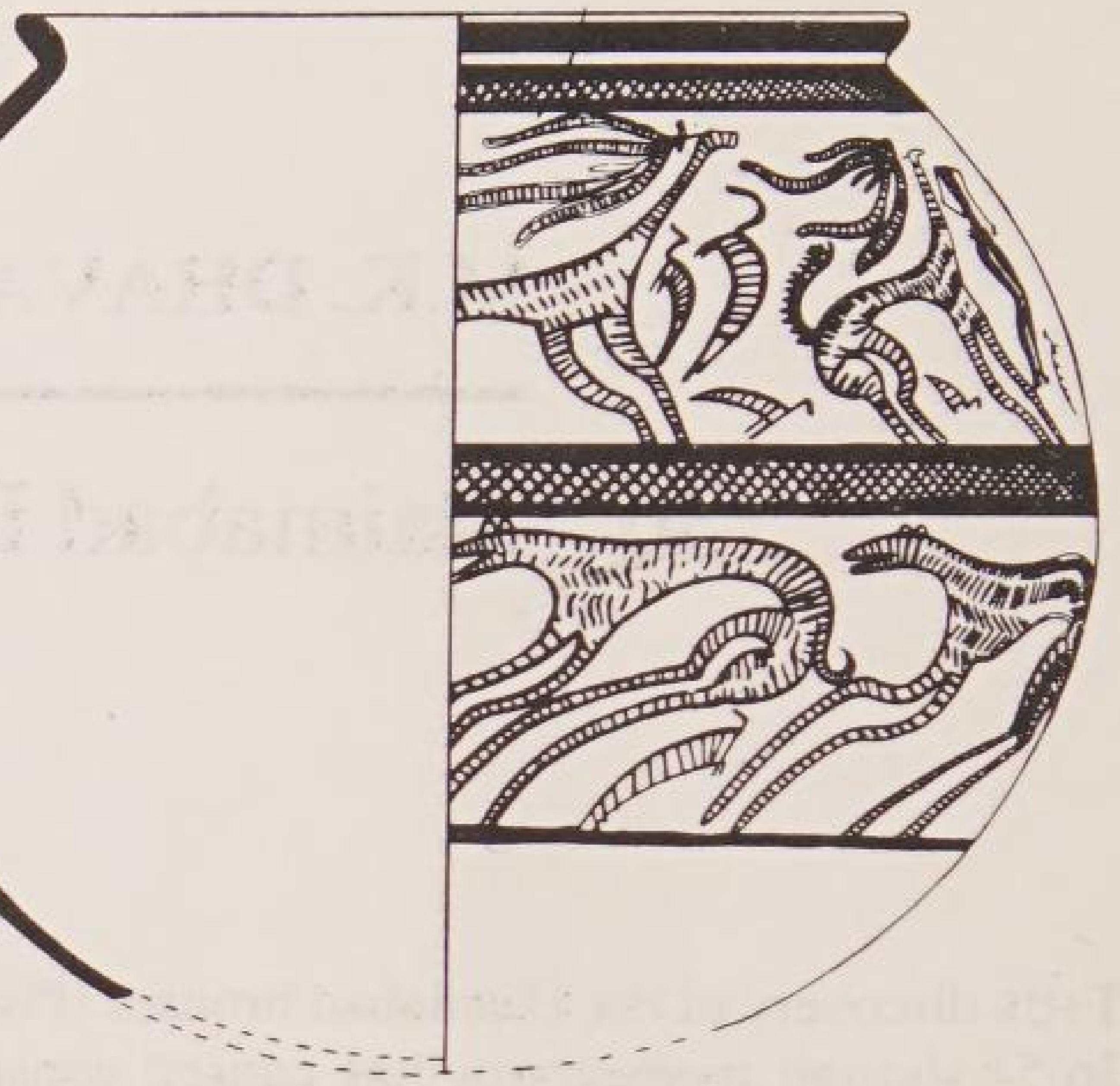

Fig. 36.1. Malwa Ware jar from Daimabad.

The pair of bulls yoked to the chariot are extremely interesting with regard to the modeling of their hind parts which gives them the appearance of a horse rather than a bull. In fact their tails cannot by any stretch of imagination be likened to those of bulls. They look distinctly more horse-like, as do their mouths. This bull-horse combination of the body is strikingly similar to that of the "unicorn" which is so commonly depicted on Indus seals. It is equally noteworthy that a "unicorn" with two horns has been found on a seal from Kalibangan (Lal 1979: 91). The Daimabad bulls stand together on two separate metal strips, one for the front and the other for the hind legs. Their humps are quite massive. But another remarkable feature of these bulls is the prominence of their projecting horns. This is also a feature which is characteristic of the terracotta bulls from Chanhudaro and apparently they are also seen on animals in Sind today (Mackay 1943: 164, Pl. LVIII, 1, 1a). Such bulls, however, are not represented in the Chalcolithic art of the Deccan.

The chariot has many Harappan features. It should be made clear, however, that such an elaborate vehicle has so far not been reported from any

Harappan site. There are a few toy cart models of copper (Piggott 1970). But they too share some elements with the Daimabad chariot. The copper carts all have projecting ring loops through which the axle is passed. The most noteworthy feature of the axle is that it is fixed to the wheels so that it moves along with them: the same feature is also a part of the modern chariot. The toy carts, presumably of bronze, from Chanhudaro were apparently built the same way. "The wheels are now immovable, but they must originally have revolved in two axle-brackets cast in one with the frame" (Mackay 1943: 164). This feature may have facilitated the dismantling of the vehicle since the chasis could just be lifted off the axle much as they do today in Sind (Mackay 1929: 26-28). It is pertinent to quote Childe in this connection: "Sumerian and other early vehicles were probably just as easily taken to pieces, and this point must be remembered in considering the possibility of using them for long distance transport" (Childe 1951: 183). This would be possible because of the manner in which the axle was fixed to the wheels. One is told that this mechanism actually marks an early stage in the evolution of wheeled vehicles (Singer *et al.*, 1956: 72). And what is more, even the village carts of modern Sind "preserve the main outline of the ancient Harappan vehicles, the wheels turn in one piece with the axle as do those of many other recent carts with solid wheels" (Mackay 1929). The joined wheel and axle is thus a distinguishing feature of Harappan vehicles and same is to be seen in the Daimabad chariot.

ELEPHANT (Pl. 36.3)

The elephant is the largest of the three animals in the hoard. The beast stands on a platform 27 centimeters long and 14 centimeters broad. There are four ring loops which once held the wheels, all of which are unfortunately missing. The total height, including the platform, is 25 centimeters. The large trunk is curved at the lower tip but the tusks appear to be broken or not completely indicated. A short tail is almost hidden in the rump. This animal recalls another bronze elephant from the southeast Deccan (Barret 1958) which is dated to about the third century A.D. Barret's specimen is a female, standing, or rather running, on a platform with raised edges and ring loops for wheels (all of which are missing). There is a small bell tied around its body.

There is some superficial resemblance between Barret's pachyderm and the Daimabad specimen. Technologically, however, they are far removed from one another. The former was hollow cast. The Daimabad elephant is solid. There are sufficient stylistic and technological differences between these two specimens which show that the Daimabad elephant cannot be dated to the early historical period.

RHINOCEROS (Pl. 36.4)

The rhino stands not on a platform as in the case with the elephant, but on two horizontal bars over two sets of wheels; the bars are bent at both the ends with the axle passing through them. The wheels, which are solid with a projecting hub on the inside, are fixed to the axle and move along with it. The rhino is 25 centimeters long and 19 centimeters high with a distance of 13 centimeters between the two sets of wheels. Skin folds on the animal's body are rather stylistically depicted with those on the back and the belly forming a sort of rectangle. This resembles the treatment on some of the Indus rhino seals (Marshall 1931: III, Pl. CXV, No. 342-46). Short ears are pointed upwards. The mouth is too long and resembles the snout of a bear. A short horn on the tip of the snout is also indicated. Rhinos probably inhabited the northern Deccan in prehistoric times and the beast has been tentatively identified at Inamgaon (Classon 1977: 255).

The presence of the rhinoceros in the hoard is extremely important because the animal was never portrayed in Indian art save the Harappan,[1] and they delineated the beast with considerable sympathy. Thus its presence in the Daimabad hoard points to its Indus origin. The Daimabad example can also be favorably compared with a terracotta specimen from Lothal (Rao 1978: 62).

WATER BUFFALO (Pl. 36.5)

The buffalo also is modeled in a naturalistic manner. Its height, including that of the wheels, is 31 centimeters and the length is 25 centimeters. It resembles a bison somewhat, but on close observation it is clearly a water buffalo with characteristic transverse ribbing on its horns. The animal stands on a platform similar to that of the elephant, but the corner near the right foreleg is broken. The axles attach to the platform through vertical bars which are provided with holes. The front wheels are smaller (eight centimeters in diameter) than those on the rear (10 centimeters).

DISCUSSION

The bronzes described above are no doubt the handiwork of an extremely skilled sculptor. They are in fact the finest of their kind in the whole range of Indian prehistoric art. But they were not recovered from sealed deposits in a controlled dig. This fact, in addition to the excellence of the workmanship, has caused doubts to be expressed regarding their age.

The four pieces were actually found by some Bhils who were digging on the site for a large tree root they had cut for firewood. When the bronzes came to light they were reported to the police authorities since they came from an ancient site protected by the Archaeological Survey of India. The press learned of it the next day and we lost no time in visiting the spot since we were closely associated with the earlier excavation at the site. The pit dug by the Bhils in which the objects were found was located. The tree they had cut was not very large so the pit was correspondingly small: about a meter in diameter and a meter deep. We scraped the section and the bottom of this pit to ascertain whether a later pit had been cut into the earlier layers. If traces of a later pit had been present it would then definitely have proved that the bronzes were interred after the Chalcolithic occupation at the site. We did not, however, come across evidence for a later pit. On the contrary, there were regular horizontal layers undisturbed by any later activity. This has now been confirmed by the recent excavations by S.A. Sali (in press) who has encountered a distinct cultural strata, about a meter thick, with Late Harappan material. Stratigraphically, therefore, the bronzes have to be ascribed to the Late Harappan Period—Phase II of Sali—which can be dated to the first quarter of the second millennium B.C. This is also confirmed by S.R. Rao (1978: 62) who states: "I examined the place where they (the bronzes) were found and after sinking an exploratory trench at the site, confirmed on the basis of stratigraphic and ceramic evidence that the bronzes belonged to the Late Harappan (circa 1800-1600 B.C.) phase." Stuart Piggot has also suggested a Late Harappan date for the bronze toy carts from Harappan sites. He is of the opinion that "they are (not) stratified in meaningful terms and we are free in fact to assign them either to the Indus Civilization . . . or to some later period within the second millennium B.C." (Piggott 1970: 202).

The next problem to be examined relates to the authorship of the bronzes. Agrawal, Krishnamurthy and Kusumgar (1978: 45) have questioned their antiquity on the basis of the presence of arsenic, which according to them, is absent in artifacts from Chalcolithic sites in the Deccan. It should also be noted that the Deccan has no known copper ore deposits and the poor Chalcolithic farmers could not have afforded the luxury of these bronzes. But now that it is seen that they can be assigned to the Late Harappan Period at the site, the possibility that they were imported into the Deccan should be discussed. In this connection it must be pointed out that of all the Indus centers, the bronze artifacts from Harappa have a considerable proportion of arsenic. It has been observed that "The hardness of most of the copper objects found at Harappa has been shown on analysis to be due to a high arsenic content. The presence of this arsenic is believed to be accidental, being indigenous to the copper deposits from which the ores were extracted rather than secondarily introduced" (Coghlan 1951: 44-56). Lamberg-Karlovsky (1967: 151) therefore rightly argues that "We must not disregard the possibility, however, that the smiths recognized the advantages of an ore with arsenic in it for producing a harder, less brittle tool." In the light of evidence from Harappan artifacts, one is of the opinion that the Daimabad bronzes may originally have been Harappan, that is, from Harappa proper, and that they were probably imported into the Deccan.

Arsenical alloying is also significant in the Copper Hoard from the Ganges-Yamuna *Doab* (Agrawal, Krishnamurthy and Kusumgar in press). But there was no contact between them and the Chalcolithic Cultures of the Deccan. The present hoard, therefore, cannot be attributed to the Copper Hoard Culture. Incidentally it may be mentioned that copper was plentifully available to the Harappans if judged by the quantity of copper artifacts from Indus sites. And if the identification of Meluhha with the Indus empire is accepted, they were even exporting copper to West Asia (Rao 1968).

Now, a few words on the function of the bronzes. All the objects in the hoard are too big and heavy to play with and therefore cannot be classed as toys as is the case with the bronze elephant from the southern Deccan (Barret 1958). Second, copper was an extremely scarce commodity in the Deccan. The bronzes may then have been created on the order of the ruling chief/priest of Daimabad. It is also possible that the entire community contributed towards the cost. This is especially likely if the bronzes were required for community religious purposes. Recall that all the bronzes were provided with wheels; although those on the elephant were lost. Thus it is not unlikely that they were meant to be used in procession, possibly as seen on a seal from Mohenjodaro with four animals (an elephant, a rhino, a tiger and one unidentified animal) in a file facing right (Marshall 1931: II, 365; III, Pl. CXVI, 14 & CXVIII, 10). Again from Mohenjodaro comes a seal amulet on one side of which is an animal in the center, a *gharial* according to Marshall, on either side of which is a bull. Below the central animal is an elephant on the left and a tiger on the right (Mackay 1938: Vol. I, 357; Vol. II XCI, 13, 19a; XC, 2a, 10). It is thus clear that these animals (viz. the elephant, rhino, bull, buffalo, tiger, etc.) played an important role in the religious life of the Harappans. The same tradition, in some form or other, seems to have continued to some extent in the succeeding Chalcolithic cultures of the Deccan. A Malwa Ware jar, again from Daimabad, is profusely painted with a jungle scene in two horizontal registers (Fig. 36.1). The upper one shows a muscular human male figure with two deer approaching, as if enchanted, and peacocks in between. The lower register has three tigers springing away in the opposite direction. The human figure is solid while the bodies of the animals are hatched. These scenes have a narrative quality, and one feels that the animals are paying obeisance to their Lord (Indian Archaeology: A review 1958-59: Fig. 8). Similar animals are depicted on a Malwa Ware vase fragment from Prakash (Thapar 1967: Fig. 12; and Fig. 36.2).

It is tempting to identify the person in the chariot as *Paśupati*, "The Lord of Beasts," for the simple reason that all the animals, save the tiger, which appear on the famous *Paśupati* seal from Mohenjodaro, are present in the Daimabad hoard. Marshall's identification of *Paśupati* on the seal was based on comparisons with medieval representations of Śiva

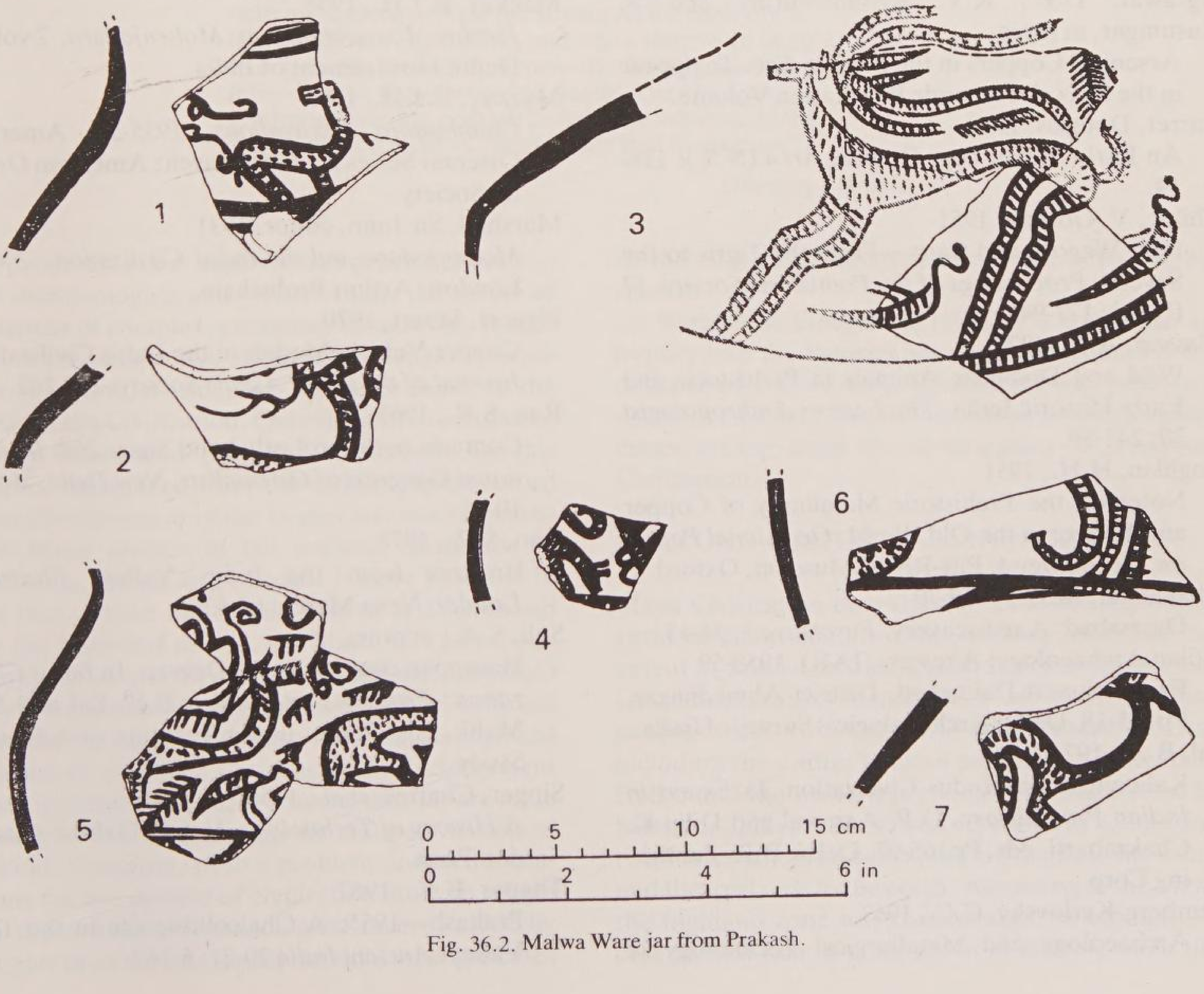

Fig. 36.2. Malwa Ware jar from Prakash.

(Marshall 1931: I, 52-56; Pl. VII, 4). Presently, however, one is not concerned with the identification and the iconography of the figure. One can only conclude that the evidence discussed in the foregoing pages amply demonstrates that in all probability the bronzes in the hoard belong to the Late Harappan period at Daimabad, and that they were probably imported from Harappa, or some smith from Harappa made them locally.

NOTE

[1] The rhinoceros is depicted on the coins of Chandragupta II (A.D. 380-415) where it signifies the conquest of eastern India.

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ROBERT SHARER

37. Did the Maya Collapse? A New World Perspective on the Demise of the Harappan Civilization

"Once this whole area teemed with life. Mayans, with an ancient culture far advanced for their times, had lived here, died here, and when they were unable to cope with the steady approach of the jungle, they left—before they starved to death. They had no equipment strong enough to fight the advance of the jungle so that most of them finally had to give up."

Dorothy Daniels

THIS paper considers a question of general interest to most archaeologists and prehistorians, the nature of the demise of complex, preindustrial societies. It does so from the perspective afforded by a single example from the New World, that of the collapse of the Classic Maya Civilization. Over the years a number of theories have been proposed to account for this collapse, recognized from the archaeological record by the abandonment of the largest and most sophisticated Maya centers in the lowland rainforests of Guatemala, Belize and Mexico. It must be borne in mind that, unlike the demise of civilizations known from the historical record, the Maya, like Harappan society, represents an example of collapse identified solely from archaeological evidence. While historical records of the Maya Civilization are being recognized as the result of recent advances in the decipherment of hieroglyphic texts, these sources thus far are mute as to the events surrounding the collapse. Events of this kind, therefore, pose a problem in which explanations for the demise of civilization must be sought from the available archaeological record, aided by analogies drawn from appropriate documented cases in the historical, ethnohistorical and ethnographic record.

With these thoughts in mind, it is hoped that an inquiry into the theories advanced to account for the collapse of Classic Maya Civilization may provide a useful perspective for scholars concerned with similar issues arising from the investigation of Harappan Civilization.

CULTURE HISTORICAL BACKGROUND

Maya Civilization developed in an extremely differentiated environment, within an area defined by the extent of known archaeological sites and the present (or ethnohistoric) distribution of Maya-speaking peoples. This corresponds to southeastern Mexico, including the entire Yucatan peninsula, Guatemala, Belize and the western portions of Honduras and El Salvador. This area has been described as comprising two basic ecological zones, the highlands to the south and the lowlands to the north. According to this view, the highland zone was characterized as ecologically diverse and rich in a variety of resources, while the lowlands were viewed as ecologically uniform and poor in resources. Based upon these purported environmental contrasts, a distinction was often made between the cultural developments in these zones; that is, between highland and lowland Maya Civilization. Because the lowlands were viewed as a less advantageous zone, the ancient lowland Maya were seen as an enigma, an exception to the rule that brilliant civilizations could not develop in marginal tropical environments (Meggers 1954). Alternatively, the same environmental assumptions have been used more recently to "explain" the rise of lowland civilization by positing the development of organizational complexity as a consequence of the need to maintain long distance trade networks that supplied the "deficient" lowlands with imported necessities (Rathje 1971).

Recent ecological studies have overthrown the notions implicit in the simple highland-lowland environmental contrast. It is now recognized, for example, that the Maya lowlands are not deficient in resources, and that instead of being ecologically uniform, they are characterized by a considerable diversity in soil types, vegetation, hydrology and climate. As a result, recent ecological and archaeological research demonstrate that both the environment of the Maya area, and the cultural developments it fostered, are too varied to be subsumed under a simple highland-lowland dichotomy.

An obvious, but often ignored, geographical fact is that the ancient Maya as a whole occupied an extremely strategic position, both because of their wealth of resources (jade, chert, obsidian and cacao being among the most prized commodities) and because of their location between the heavily populated urban states of Central Mexico to the northwest and Central America to the southeast (Fig. 37.1). The Maya Civilization reached its zenith during the Classic Period (ca. A.D. 250-900) in the central and southern lowlands. The Maya Classic is traditionally defined by the appearance of hieroglyphic texts carved on stone monuments, wooden lintels or other artifacts, as well as painted on pottery and occasionally preserved on wall frescos, along with the advent of polychrome decorated pottery, and certain architectural traits such as the use of corbelled masonry vaults. However, it is recognized that many of these characteristics, along with the more significant development of complex social, economic and political organizations, arose in the Maya area during the preceding Preclassic Era (ca. 2000 B.C.-A.D. 250). While occupation in the Maya lowlands is believed to begin at least by ca. 2000 B.C. (Hammond *et al.* 1979), it is likely that the direct antecedents to the Classic Maya Civilization lie to the south, in the Highlands and the adjacent Pacific coastal region.

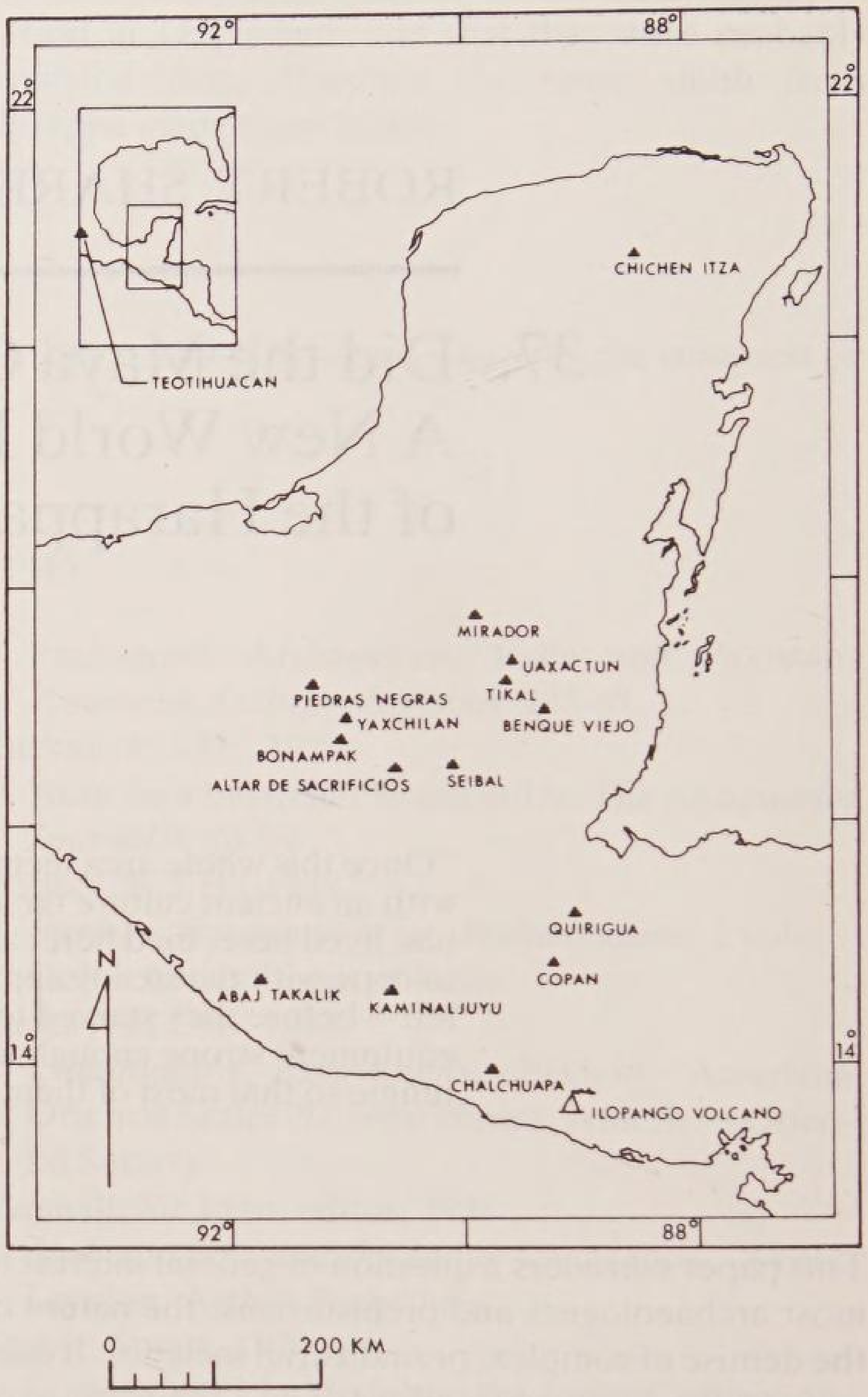

Fig. 37.1. Archaeological sites mentioned in the text.

THE RISE AND FALL OF THE SOUTHERN MAYA

The Pacific plain provided the earliest and most direct trade routes between Central Mexico and Central America. This coastal area was also one of the prime regions of Precolumbian cacao cultivation. The adjacent highlands provided both jade and obsidian, as well as other valuable commodities such as hematite, volcanic grinding stones and quetzal feathers (prized for use in elite headdresses). The Olmec of the Mexican Gulf coast appear to have been the first power in Mesoamerica to control these resources and the Pacific coastal route during the Middle Preclassic Period (ca. 1200-400 B.C.).

After the decline of the Olmec, a series of centers along the coastal plain, many probably founded by the Olmec, seem to have gained control over local resources, such as cacao production, and at least portions of the coastal trade route. The earliest examples of Maya hieroglyphic texts and Maya sculptural style are found at several of these sites, such as Abaj Takalik (Graham 1976), and Chalchuapa (Sharer 1974, 1978). In addition, the primary southern Maya highland site of Kaminaljuyu, located near both jade and obsidian sources, also rose to prominence during this period (Shook and Kidder 1952). Archaeological investigations at these southern sites indicate rapid growth in population and the development of stratified, theocratic organizations, including evidence of ceremonial structures and ritual activities recognized as typically Maya. In other words, these coastal and highland centers represent the first florescene of the Maya Civilization several centuries before the beginning of the Lowland Classic Period.

The precocious development of the southern Maya fell into a sudden decline at the end of the Preclassic Period. This setback seems due to two related causes, the first being a major volcanic event, the eruption of Ilopango in Central El Salvador (Sheets 1971) that cut agricultural production, depopulated a wide area and severed the coastal trade connections between Mexico and Central America (Sharer 1974, 1975). The timing of this disaster (third century A.D.) and its consequences, including the rendering of a vast area within a 100 kilometer radius of Ilopango uninhabitable because of massive ash falls, for up to 200 years, has been documented by Sheets (1976, 1979) and his colleagues. Depopulation due to death and migration of survivors was immediate. Investigators have long noted an apparent population decline at some southern sites (Parsons 1969: 27) and even abandonment of others (Shook and Proskouriakoff 1956) during this period. While the bulk of the Pacific coastal agricultural region appears to have escaped heavy damage, ashfalls probably reduced soil fertility and production. It has been proposed that disastrous flooding from torrential rainfalls spawned by Ilopango's ash cloud affected much of the Maya area, and that even light ashfalls could have reduced food resources such as the aquatic life harvested from rivers and coastal areas (Dahlin 1979). Dahlin (1979) has hypothesized that it was the refugees from Ilopango who introduced cacao production and an era of prosperity into new areas, most notably the Maya lowlands. The coastal trade network on the other hand, certainly could not be maintained without the population that sustained it. The subsequent loss of trade connections through the area produced a final economic disaster for the southern Maya.

The second factor in the decline of this region followed closely on the heels of the first: the colonization by Teotihuacan and the consequent loss of independence for the southern Maya. Teotihuacan was the first true urban state in Mesoamerica, and rose to power in Central Mexico during the last few centuries of the Preclassic Period. Perhaps taking advantage of the disruption and chaos in the wake of the Ilopango eruption, Teotihuacan appears to have seized control of the south coast. Eventually, as the area's population and cacao production recovered, Teotihuacan established a colonial capital at Kaminaljuyu in an attempt to monopolize the acquisition and distribution of jade and obsidian throughout Mesoamerica.

As the southern Maya lost their control over cacao production and the trade routes, several centers located to the north in the central lowlands began an era of prosperity and growth that endured throughout the Classic Period.

THE RISE OF THE LOWLAND MAYA

The best known and seemingly dominant center of the Maya Classic was Tikal, extensively investigated from 1956 to 1970 (Coe 1967). Many other lowland sites are known, and a dozen or so have been subjected to detailed archaeological study, including Uaxactun (Ricketson and Ricketson 1937; Smith 1950), Altar de Sacrificios (Willey 1973), Seibal (Willey 1978), Lubaantun (Hammond 1975), Quirigua (Sharer 1978; Ashmore 1979) and Copan (Willey and Leventhal 1979; Baudez 1979). Most of the sites known from the central lowlands were founded by the Middle Preclassic Era (ca. 1200-400 B.C.), although several from peripheral areas appear to have been established as colonies as late as the Early Classic Period (ca. A.D. 250-600).

For the most part these lowland centers served a variety of functions. During the Preclassic Period these certainly included ritual events, agricultural production, as well as the manufacture and trade of products from local resources such as chert, wood, clay and animal pelts. The larger lowland centers appear to have included ceremonial structures and the residences and administrative headquarters for an emerging theocratic ruling elite, as well as the workshops, storerooms, markets and homes for the non-elite classes. The growth of long distance trade certainly played a role in the development of the lowland Maya society. For example, sites located along major river systems such as Altar de Sacrificios and Seibal, were intermediaries in trade between the highlands and the Gulf Coast. Tikal, however, is not located on a river; instead it is centered between the headwaters of the river systems that drain both to the east (Caribbean) and to the west (Gulf of Mexico). It was, therefore, along the route across the base of the Yucatan peninsula and in a prime position to monitor and control the portage of goods transported by canoe over both river systems (Jones 1977a). For this reason Tikal appears to have become a dominant economic power. However, the yet-to-be excavated site of Mirador, situated in a similar position to the northwest of Tikal, promises to have been a rival power, at least during the critical Preclassic-Classic transitional period.

The trans-lowland routes would have been of only minor importance as a long distance trade connection between Mexico and Central America as long as the more direct southcoast route prospered. However, with the breakdown in the latter route due to Ilopango, the best alternative connection would be to the north, bypassing the difficult highlands, and utilizing the already developed canoe transport system of the lowlands. It is postulated that Tikal was in the best position to profit from the expansion of the trans-lowland route, and thus its rapid rise to dominance may have been due in no small measure to its strategic economic and geographic position (Sharer 1975).

Present understanding of the lowland Maya sees a society of evolving complexity that was quite different in many respects in its final form (Late Classic) from that of the Preclassic or even the Early Classic. The present view relies heavily upon the Tikal evidence, the most comprehensive lowland data base. In fact, it appears that the socio-cultural development of Tikal was accelerated, compared to other lowland sites, by the Early Classic. Tikal's precocious size, importance and vigor clearly indicates that it held a dominant position in the southern Maya lowlands (Willey 1974: 426), and it seems to have eclipsed other centers that had enjoyed prominent positions during the Late Postclassic such as Mirador, or the smaller site of Cerros (Freidel 1979). Tikal's dominant position probably stems from a central position that allowed it to control trade across the base of the Yucatan peninsula, and offered a natural defense against attack. By Early Classic times Tikal's natural defenses were strengthened by earthworks (Puleston and Callender 1967).

The Tikal ruling elite seem to have achieved hereditary status before other centers in the lowlands, recording dynastic succession at that site by the Early Classic (Coggins 1975) or possibly before (Haviland 1967, 1977). The elite of Tikal, perhaps in the role of merchant princes, amassed considerable power and wealth by controlling the internal overland and river trade routes, monopolizing raw-material acquisition and distribution of goods within the lowlands. Early Classic Tikal and its lowland domain were incorporated into a much larger Mesoamerican economic network managed ultimately by Teotihuacan (Ball 1974). Tikal's role was probably that of the major lowland transhipment center (Rathje 1973: 441) principally for highland obsidian (Sanders 1973: 353) and lowland resources destined for manufacturing centers via both the Gulf Coast and the Teotihuacan-controlled center of Kaminaljuyu in the highlands. Political alliance with Teotihuacan appears likely, and Tikal's elite may have legitimatized their power and authority in both practical and supernatural terms. Coggins (1975) has proposed that the Early Classic ruler known as "Stormy Sky" was the child of a marriage between families representing the indigenous ruling lineage of Tikal (his mother) and an elite lineage from Kaminaljuyu (his father, a member of the Teotihuacan-derived "Sky" dynasty). As ruler, "Stormy Sky" brought the aggressive mercantile orientation of Teotihuacan into power at Tikal, founding a new dynasty made legitimate by his descent, via his mother, from the traditional ruling lineage (Coggins 1979).

Outside of Tikal, the Maya lowland society in the Early Classic seems to have been less stratified, characterized by considerable social mobility (Rathje 1970, 1973). In other lowland centers, individuals appear to have achieved elite status by amassing power and wealth through successfully controlling the access and distribution of lowland resources (Rathje 1973: 416-17). However, these local merchant-elites were probably economically dependent upon the Tikal rulers, because of Tikal's role as the central redistribution center for lowland resources. Furthermore, it now appears that Tikal may have sponsored the founding of colonial centers in peripheral regions of the lowlands in order to gain control of resources as well as to monopolize trade routes that passed through these areas. A case in point appears to be Quirigua, located in the southeastern periphery and within the rich Motagua valley, commanding a position, along with Copan, to control trade between the lowlands and Central America (Sharer 1979).

The mid-Classic decline and eventual destruction of Teotihuacan resulted in the collapse of its long-distance trade network. These events must have been a profound setback for the elite of Tikal, and for the entire lowland economic system. This disruption appears to have produced a perceptible lag in the archaeological record known as the lowland hiatus (Willey 1974). It has been suggested (Coggins 1979) that the hiatus at Tikal was marked by a struggle and, perhaps, a compromise sharing of power, between the traditional ruling lineage and the mercantile "Sky" dynasty founded by "Stormy Sky." Regardless, although the power of Teotihuacan was gone, its efficient political and economic management was not forgotten by the Maya. The new order that emerged in the lowlands in the wake of Teotihuacan was probably modeled in some ways after the Mexican state system. However, Late Classic lowland society was less centralized, with numerous elite centers, free from the control of both Teotihuacan and Tikal, vying for domination (Willey 1974: 426). It is likely that this renewed system was forged by a few aggressive leaders in various elite centers. Jones (1977b) has identified the first dominant ruler of Late Classic Tikal ("Ruler A"), and this individual probably both led the rebirth of that center and reasserted the power of the Early Classic "Sky" dynasty symbolizing his supernatural and lineage ties to the dynasty founder, "Stormy Sky" (Coggins 1975, 1979).

Tikal, representing the traditional lowland dynastic power (Haviland 1967, 1977) appears to have played a key role in the development of ruling lineages at other lowland sites. The dynasties at these other sites probably derived and periodically reinforced their legitimacy by intermarriage with the ancient Tikal ruling families (Molloy and Rathje 1974). Dynastic intermarriage between various elite families seems also to have been a common means of establishing political alliances (Molloy and Rathje 1974). The "Jaguar" lineage at Yaxchilan, especially its most aggressive ruling member, "Bird Jaguar," exemplifies this process (Proskouriakoff 1963, 1964). At Quirigua the ruling dynasty may have come from Tikal, using the same name ("Sky") and symbols of authority such as the so-called manikin scepter, that Coggins (1979) sees at Tikal as deriving from the mercantile heritage of Teotihuacan.

In the economic sphere, it appears that the lowland centers gained control of the local trade networks, with Maya elite managers reaping the wealth and power that were formerly siphoned-off to Teotihuacan. Instead of being a resource area and market for Teotihuacan, the lowland Maya developed their own economic organization. Tikal may have used marriage alliances with the newly emerging lowland powers in order to re-open and control the old long-distance trade routes extending through the Maya area (Jones 1977b). Once re-established, external trade provided an important source of the material wealth that characterizes Late Classic Maya society. Internally, Tikal and the other lowland centers increased their potential for manufacturing as regional networks supplied raw materials, and a variety of craft specialists produced goods for the internal market. For example, about one-third of the pottery used by the average Tikal household in Late Classic times was elaborately decorated polychrome, the product of specialized local manufacture (Culbert 1974: 52-53). Distribution, in turn, was handled by an expanding group of specialized merchants (Adams 1970). This is exemplified at Tikal by the large Late Classic constructions (Structures 5E-32 through 36), identified as the central market complex (Coe 1967). Significantly, as population increased throughout the lowlands, the distrubution of food probably became increasingly dependent upon the same trade and exchange mechanisms.

To summarize, Late Classic Maya society can be viewed as a series of independent secondary state systems (Webb 1964) each modeled after Teotihuacan. Throughout the lowlands absolute power was vested in dynastic rulers assisted by hereditary elites. Late Classic lowland society became politically fragmented and culturally diversified as competing dynasties maneuvered to secure or increase their power and wealth (see Willey 1974: 426). This trend is reflected in the diversity of Late Classic material culture, especially pottery (Willey, Culbert and Adams

1967). At the same time, the alliances between ruling families are reflected in the uniformity of elite-related culture such as regalia, writing and calendrical systems, and so forth. Overall, society tended to be more rigid; social mobility was reduced as status, at least for the elite class, came to be based more on birth than ability (Rathje 1970). Most significantly, the emergence of a state system was accompanied by expansive growth among the lowland Maya. State control over the economy and labor allocations resulted in more efficient production and distribution of food, as well as other goods and services. And until the environment became exploited to its limits, increases in food supplies and efficiency of distribution allowed further population rise throughout the lowlands. The larger populations then required more structured managerial control, and both the size and complexity of society began an upward growth spiral.

THE MAYA COLLAPSE

It was this rich and complex Maya lowland society that suffered a seemingly dramatic demise at the close of the Classic Period. Over a relatively short period of time, roughly corresponding to the ninth century (A. D. 790 to 889, or 9.18.0.0.0 to 10.3.0.0.0 in the Maya calendar) the archaeological record indicates a slowdown and even a cessation in activities over most of the central lowlands, an area of some 150,000 square kilometers (Adams 1973). At most sites in this area the construction of administrative, residential and ceremonial structures declined. No further dynastic monuments were erected, hieroglyphic texts and calendrical dates were no longer recorded. The manufacture and distribution of traditional luxury and ritual goods made of pottery, jade, wood, bone and shell ended. From this kind of evidence, it can be inferred that the failure of the lowland Maya involved primarily the ruling elite, the class that sponsored and directed the majority of the activities that disappear from the archaeological record. Furthermore, the spatial pattern of the cessation of these activities indicates that the failure was more complete in the central lowlands than it was towards the peripheries to the north (Yucatan) and east. Occupation is continuous in these regions, albeit on a presumably less complex scale. But, in the case of Yucatan the population appears to increase. In fact, even in the great central lowland sites such as Tikal, the archaeological record reflects a continuity of occupation, in ever diminishing numbers, for several centuries after the end of the old elite-associated activity (Coe 1968: 175). At some point several hundred years before the arrival of the Spanish, all of the central lowlands was abandoned to the rainforest, except for small settlements around the lakes of the central Peten.

It should be noted that Maya Civilization does not terminate with the end of the Classic Period. However, developments from the ninth century until the Spanish Conquest in the sixteenth century, corresponding to the Postclassic Period, are devoid of many characteristics that define Classic Maya lowland culture, especially in those traits that distinguish the elite segment of society. Furthermore, Postclassic Maya society is centered in two distinct regions, the northern half of the Yucatan peninsula and the southern highlands of Guatemala.

The question as to what caused this demise appeared as soon as many of the great centers of the Classic Maya were rediscovered in the lowland rainforests during the 18th and 19th centuries (Stephens 1841, 1843). The early answers to this question all stressed sudden catastrophe, an obvious conclusion given the dramatic contrast between the empty and silent jungle-covered ruins and what was recognized as once being a populous and highly developed civilization. To the European mind, a great civilization set in the depths of an inhospitable rainforest seemed like a contradiction in terms. Thus it seemed only logical to assume that the Maya would fail due to the hardships of their environment. That they succeeded so brilliantly for a time was viewed, often even unto this day, as something of a "mystery." To early scholars, however, the question of why the Mayans failed was often not as important as the question of origins; where did they come from? And, of course, this question was initially answered by recourse to migrations from a host of known civilizations in the Old World (Willey and Sabloff 1974: 21-40).

With the general acceptance of the idea that the Maya represented an indigenous New World development, attention turned to the reasons for the mysterious abandonment of the lowland cities. Since the turn of the century dozens of theories have been advanced, and two general trends can be discerned. In the first place, there has been a shift away from theories that propose a single cause, towards theories that advance multiple factors as responsible for the Maya demise. Secondly, there has been a shift away from sudden and dramatic catastrophes, towards more subtle, longer-acting processes. Both of these trends reach a culmination in the results of a symposium held in 1970 to consider the collapse question and to re-evaluate the problem in light of the rapidly accumulating new evidence about Maya Civilization resulting from an unprecedented amount of archaeological research available at that time (Adams 1969).

The results of this conference have been published (Culbert 1973) and provide the most comprehensive treatment of the subject to date. Significantly, one conclusion from the conference was the realization that a better understanding of the Maya demise could only be achieved by a better understanding of the cultural processes operating in ancient Maya Civilization (Culbert 1974: 113). Given the additional progress made in the knowledge of the ancient Maya since the collapse conference was held, it is obvious that one should be in a better position to understand the Maya demise today than one was only ten years ago. In other words, as traditional concepts of the ancient Maya are modified or replaced by new information, understanding of the collapse will be altered, and any evaluation of the Maya collapse issue must be considered with this perspective in mind. For example, results of research completed during the last twenty years have challenged and overthrown traditional concepts about ancient Maya social and political organization (Becker 1979). The view of Maya sites as "ceremonial centers" and the "priest-peasant" organizational model (Thompson 1954, 1966) have been replaced by far more complex reconstructions of ancient Maya society. The belief that swidden agriculture provided the subsistence base (Morley 1946) has been the latest casualty of more thorough, problem-oriented research. Although a fundamental change in concepts of ancient Maya subsistence was on the verge of being recognized at the time of the collapse conference, the full realization that the lowland Maya relied upon a complex intensive agricultural system has come about *since* the conference (Harrison and Turner 1978).

Old ideas die hard, in this case one reason being that Maya archaeology (like the archaeology of many complex societies) has long been dominated by "the pyramid syndrome." Investigations have traditionally been directed towards the largest sites and, within sites, the most elaborate or impressive buildings. As a result, knowledge of Maya society is heavily biased towards the elite segment that occupied palaces, temples and tombs. One reason why the remains of intensive agriculture in the Maya lowlands were unrecognized until recently was simply because few scholars bothered to investigate the fields and terraces of the ancient farmer.

While it is obvious that a more balanced sampling of archaeological data should produce a better picture of all aspects of ancient Maya society, excavation and funding priorities have tended to preserve this traditional research bias even to the present day. Until recently the only exception to the traditional approach was Willey's 1954 investigation of rural Maya settlement in the Belize River Valley (Willey *et al.*, 1965). Future work, including more studies based upon probabilistic sampling strategies and regional rather than site-oriented research problems, should produce a more representative picture of ancient Maya society. If this be true, it can be expected that the present assessment of the Maya collapse question will need to be modified in only a few years time.

THEORIES CONCERNED WITH THE DEMISE OF THE MAYA

Following Sabloff (1973), it is convenient to consider the theories of the Maya collapse according to those that stress internal factors and those that stress external factors. The former category includes theories that view the Maya collapse as generally isolated from developments occurring in the wider context of Mesoamerica. The latter category includes theories that propose that the collapse was *due to* developments originating outside the immediate Maya area.

Internal Theories

Most of the earliest attempts to explain the end of Maya Civilization were in this category, but several recent proposals have also emphasized internal factors involved in the collapse. The most useful internal theories can be considered according to three themes: natural catastrophes, ecological disaster and sociopolitical disintegration (Sabloff 1973).

Several kinds of natural catastrophes have been advanced as possibly triggering the demise of Maya Civilization. The hypothesis concerning the role vulcanism played in causing the decline of Preclassic society in the southern Maya area has already been mentioned (Sharer 1969, 1974; Sheets 1971, 1979). While most of the Maya lowlands are not geologically active, earthquakes do occur. The southern fringes of the lowlands are especially vulnerable to tectonic activity. Based upon the evidence of unrepaired structural damage to a major palace at the site of Xunantunich (Benque Viejo) in the central lowlands, MacKie (1961) proposed that one or more catastrophic earthquakes may have contributed to the downfall and abandonment of lowland sites.

While earthquake damage at Xunantunich remains possible, recent excavations at Quirigua leave no doubt that major earthquakes plagued the Maya inhabitants of the southeastern Maya lowlands. Quirigua was built directly on the Motagua fault, the same one that ruptured in 1976, causing a disastrous earthquake in Guatemala and clearly revealing the fault trace. At Quirigua evidence of ancient damaged and collapsed construction as well as massive secondary buttressing of masonry buildings, testifies to ancient tectonic activity (Sharer and Bevan, in press).

While earthquakes may have affected specific areas including Quirigua and perhaps Xunantunich, there is no evidence and little likelihood that tectonic catastrophes could have devastated the entire Maya lowlands.

Other natural disasters have been proposed as culprits for the Maya downfall. The Maya lowlands are frequently visited by Caribbean hurricanes. A major storm of this kind could easily destroy agricultural production over a wide area. However, as in the case with earthquakes, it is difficult to accept that the relatively localized destructive effects of hurricanes could trigger the failure of the entire Maya Civilization. Furthermore, as several scholars have suggested the destruction of forests in a hurricane's path may have benefited the lowland Maya by clearing new lands for agricultural exploitation.

Epidemic diseases could have produced catastrophic depopulation of the Maya lowlands. Shimkin (1973) provides a good summary of the recent evidence bearing upon this possible cause. Among the first to mention this factor, Spinden (1928: 148) proposed yellow fever epidemics as a possibility. The disastrous effects of epidemic disease among New World populations is tragically documented by the consequences of the introduction of Old World diseases such as malaria and smallpox after the Spanish Conquest. Yellow fever is also usually considered an Old World disease, but its discovery among New World primates (especially howler monkeys) indicates that it may also be indigenous to Central and South America (Shimkin 1973: 283). Recently, Adams and Smith (1977) have suggested that the historically documented Black Plague that ravaged late Medieval Europe provides a possible analog for the Classic Maya, especially for the social consequences of its sudden and severe depopulation. That the ancient Maya were vulnerable to epidemic disease is indicated by skeletal studies from both Tikal (Haviland 1967) and Altar de Sacrificios (Saul 1973). Both cases demonstrate progressive nutritional deficiencies and increasing disease potentials in lowland populations towards the end of the Classic Period.

A variety of proposals involving ecological disaster have been advanced to explain the Maya demise. The earliest of these were concerned with harmful consequences derived from swidden agriculture, once believed to have been the basis of lowland subsistence. The assumed destructive effects on soil fertility caused by swiddening were used by Cook (1921) to explain the failure of the Maya Civilization. Morley (1946: 71-72) proposed that swidden agriculture gradually converted forested areas into savanna grasslands. Since the Maya had no tools to cultivate the grasslands, they were eventually forced to abandon the central lowlands. Another effect of swidden cultivation in combination with the heavy tropical rainfall, according to Cooke (1931), was severe erosion and deposition of soil into what were formerly shallow lakes, but are now the swampy depressions (*bajos*) found in many areas of the lowlands. Yet a study of one lowland *bajo* (Cowgill and Hutchinson 1963) fails to indicate that these depressions were shallow lakes, at least within the span of the Maya Civilization.

Perhaps the first to explicitly propose that the Maya collapsed because of their failure to successfully adapt to the lowland environment was Meggers (1954), although her thesis is flawed by grossly underestimating the subsistence potential of the Maya lowlands. Subsequent examinations of subsistence capabilities, assuming swidden cultivation, have resulted in the same verdict, that is, over-exploitation of the environment would lead to agricultural failure and this produced the Classic Maya collapse (Sanders 1962, 1963). More recently, Sanders (1973) proposed that the Maya began to intensify their agricultural base to meet growing population pressures, but the means used, grassland swiddening, proved to be ecologically disastrous.

Obviously the ecological disaster theories based upon swidden cultivation can no longer be supported given recent evidence of diversified and intensive agriculture practiced by the ancient Maya (Harrison and Turner 1978). However, over forty years ago, Ricketson and Ricketson (1937: 12) rejected the idea that the ancient Maya relied upon swiddening, and proposed that intensive agriculture would have been required to support peak populations in the lowlands. The recognition and acceptance of ancient Maya intensive agriculture does not rule out ecological disaster as a cause for the collapse. Harrison (1977) has re-introduced the *bajo* hypothesis, proposing that these features were indeed shallow lakes and could have supported intensive cultivation using a raised field (*chinampa*) system. The failure to properly manage this system, according to Harrison, resulted in the silting of the *bajos*, although more recently (Turner and Harrison 1978: 370-71) it has been suggested that environmental or climatic changes could have altered the *bajos* to produce their present condition. Most Maya scholars now agree that the documented intensification of Maya agriculture was a response to increasing population and ecological pressures. From this, it follows that the collapse may have been due, at least in part, to Maya populations overwhelming the environmental limits of the lowlands (Culbert 1974: 115-17; Sharer 1977: 544-48). Although no longer based upon the false premise of swidden and an underestimation of the lowland potential, this conclusion nonetheless strongly echoes the original ecological failure thesis of Meggers (1954).

The socio-political disintegration theories are all based, either implicitly or explicitly, upon postulated weaknesses inherent in Classic Maya society. That is, they assume that the prestige and authority of the ruling elite was destroyed, often via violent confrontations, and as a result, classic society fell apart and the lowland centers were abandoned. Over forty years ago Satterthwaite (1937: 20) had raised the possibility of revolt against the rulers, based upon the evidence of broken thrones at Piedras Negras. Later research uncovered smashed or mutilated monuments at Tikal that were cautiously taken as the result of acts of violence (Satterthwaite 1958). More recent interpretations of the Tikal evidence indicate that monument mutilation was a custom practiced throughout the Classic Period, and thus need not indicate revolution (Coe 1962: 484-97).

But the revolt idea became extremely popular. A.V. Kidder (in Smith 1950) proposed that the increasing size of the ruling class, combined with their abuses of power, led to a revolution. The best known advocate of the revolution theory was Sir Eric Thompson (1954, 1966). As Becker (1979) has pointed out however, the idea, together with the complementary two-class ("priest-peasant") model of Maya society, was associated with Thompson's popular writings and seldom appeared in his scholarly publications. Nonetheless, Thompson's "peasant revolt" theory received wide acknowledgement and even acceptance among Maya scholars (Brainerd, *revision of* Morley 1956; Altschuler 1958; Culbert 1973). The thesis holds that a combination of factors, including agricultural difficulties, malnutrition or disease, and perhaps even natural disasters, culminated in widespread disillusionment as the Maya peasant class lost confidence in their rulers. The situation was made worse by an increasing disassociation from the everyday concerns of the populace by the elite, as theocratic rulers turned increasingly to esoteric matters instead of the practical solutions for a mounting crisis. The inevitable result was a violent revolt by the peasants who then destroyed the ruling class.

An economic variation on this theme has been proposed by Rathje (1971, 1973). In this view, the elite-controlled trade network of the central lowlands (the "core area") was eventually cut off from access to critical commodities by the rise of trading centers on the peripheries (the "buffer zone"). As a result, the core area collapsed, followed thereafter by the buffer zone, which was left with no trading customers. Yet, the archaeological evidence indicates that many sites located in the buffer zone collapsed long before those in the core area, quite the opposite of what one would expect from this theory.

While based upon external conditions, a theory advanced by Webb (1964, 1973) postulates that the failure of the Maya elite to adapt their society to a changing economic and political environment, specifically, competition from rival Mexican states, led to the collapse of the lowland Maya. The conclusions of the Maya collapse symposium also point to specific failures by the ruling elite that led to the demise of their civilization, for "the Maya of the Late Classic period apparently made no technological or social adaptive innovations which might have mitigated these difficulties" (Willey and Shimkin 1973: 491). Yet others have indicated that several changes seen in the archaeological record during the Late Classic might be interpreted as attempts by the ruling elite to adapt to crisis conditions (Culbert 1977: 526-28;

Sharer 1977: 544-48).

The Maya concept of cyclical history is of relevance to the collapse issue, especially their emphasis upon fatalistic prophecies associated with the Katun cycle (an approximately 256-year span composed of 13 Katuns, each a 7,200-day time period). Each Katun in the cycle was numbered and had a distinctive set of prophecies; the Maya believed that the reoccurrence of a particular numbered Katun every 256 years brought with it the recurrence of the corresponding events and conditions from the past. Elite invocation of this cyclical concept of history at Late Classic Tikal and deliberate public association of individual rulers with Katuns linked with earlier periods of prosperity have been proposed by Coggins (1975) and Jones (1977b). This in turn has led to the hypothesis that the Late Classic Maya rulers at Tikal were leaders of a cultural revitalization process (Ashmore and Sharer 1975), and that these processes culminated in unsuccessful revitalization at the time of the collapse (Sharer 1977: 548-49).

Recently, Puleston (1979) advocated that the Maya concept of cyclical history contributed actively to the collapse. Prophecies of fundamental political and religious change associated with specific Katuns are known from the ethnohistoric record. For example, the Spanish Conquest of the last bastion of Maya independence at the site of Tayasal in 1697 was probably hastened by the approach of a new Katun cycle that augured momentous changes. Noting that the earliest signs of trouble in the Maya lowlands begin with the onset of a new Katun cycle in A.D. 790, Puleston points out that the beginning of the previous cycle (A.D. 534) corresponds with the so-called Middle Classic hiatus (Willey 1974), a time of depressed activity in the lowlands. Counting back an additional Katun cycle brings one to A.D. 278, a time eerily close to the eruption of Ilopango and the demise of the southern Maya's prosperity. The conclusion drawn from these regularities is that as the Late Classic Katun cycle approached its end, the fatalistic Maya failed to resist the forces of change that were sweeping the old order away because of prophecies that foretold fundamental changes in their society.

The final internal theory considered here calls for accelerating civil warfare as a contributing factor leading to socio-political disintegration and collapse (Cowgill 1979). This thesis sees attempts to conquer and consolidate the lowland area by one or more of the major centers in a situation analogous to the Peloponnesian wars that debilitated Greece in the fifth century B.C. Evidence for warfare among the Classic Maya exists, as in the battle and judgment scenes on the Bonampak murals (Ruppert, Thompson and Proskouriakoff 1955), and in the captive motifs frequently found in Maya sculpture. The inscriptions at the site of Quirigua frequently mention the "capture" of the ruler of Copan, a larger and presumably rival center located some 50 kilometers to the south (Proskouriakoff 1973: 168; Marcus 1976: 135). This event, apparently occurring in A.D. 737, corresponds to archaeological evidence that heralds the beginning of an era of independent prosperity for Quirigua (Jones 1977c; Sharer 1978), while possibly contributing to a decline at Copan. However, most scholars interpret evidence of this kind as depicting small-scale raiding or even ritualized conflict between centers, the result of increasing competition for land, labor, trade routes and other economic resources. It is more difficult to find support for the idea of wars of conquest on a scale sufficient to bring ruin upon the lowland Maya. Of course, mutilated sculpture, the same evidence used to support the idea of a popular revolution, could also be interpreted as the consequence of warfare.

External Theories

Explanations for the demise of the Maya that call for external causes have gained increased favor in recent years. Sabloff (1973: 37) notes that this might be due to a reaction against the isolationism inherent in the internal theories, or to the recent renewal of cultural evolutionary theory that has refocused attention on wider areas of cultural development (Erasmus 1968). Regardless of the reasons, it is obvious that the question of the Maya downfall must be viewed in the context of larger issues throughout Mesoamerica.

Foreign invasion of the Maya lowlands has been proposed by several scholars. Cowgill (1964) hypothesized that militaristic Mexican invaders conquered the lowlands and forcibly resettled the survivors in northern Yucatan, nearer the "Toltec" capital of Chichen Itza. Adams (1973) has reviewed the evidence from Altar de Sacrificios, provided primarily by a rather complete shift in the pottery inventory, and concludes that the site was invaded and conquered at the close of the Classic Period. A similar event has been advanced by Sabloff and Willey (1967) at the site of Seibal, but is based upon changes seen in the architectural and sculptural records as well as pottery. From this there would seem to be little doubt that Seibal was not only conquered but occupied by a new ruling group at the end of the Classic. The homeland for these invaders remains in doubt, but stylistic evidence and the portraits of individual rulers on the post-conquest monuments of Seibal suggest that they were foreigners sharing at least some cultural traditions with the lowland Maya. Thompson (1970) suggested that they were the Putun Maya, an ethnohistorically identified Gulf Coast group peripheral to the Classic Maya Civilization that rose to power as sea traders in the Postclassic Period. Adams (1973) rejects Thompson's Putun Maya identification, although he sees the takeover of Altar de Sacrificios as originating from the Gulf Coast. However, Adams (1973) sees the Seibal occupation as occurring slightly earlier in time by a group originating from the north (Yucatan) that is ultimately swept away by the same Gulf Coast group that later invades Altar de Sacrificios. Apart from these disagreements, all proponents of the foreign invasion thesis propose that the resultant disruptions in lowland Maya society were sufficient to bring about its demise. However, the lack of evidence for invasion or conflict at centers other than Seibal and Altar de Sacrificios, casts doubt on the cause and effect relationship between invasion and collapse. It can be argued that rather than being a cause for the collapse, the invasion was more of an effect, an event made possible by the already weakened condition of Maya society (Culbert 1974: 111). At Tikal, for instance, Culbert (1973) sees no indication of invasion or any disruption originating outside the Maya area.

The last theory to be treated involves the economic relationships between the lowland Maya and other peoples of Mesoamerica. Webb (1973) has traced the changes in Mesoamerican long-distance trade networks that mark the Classic/Postclassic transition, and concludes that the Maya became isolated from the reoriented economic and political powers that came to dominate the Postclassic. Thompson (1970) advanced a more specific scenario for this period, involving the rise of a new mercantile group, the Putun Maya, who monopolized sea coast trade routes that emerged at the end of the Classic Period. Sabloff and Rathje (1975), using data from their investigation of a Postclassic port-of-trade, on Cozumel Island, related these events to the failure of the traditional lowland elite to adapt to the new sea trade routes around the Yucatan peninsula, and thus they became economically cut off as the old land routes became obsolete. A specific case for the rise and fall of Tikal has been made by Jones (1977a), based upon that site's position controlling the trans-lowland canoe routes. When these routes diminish in importance, the site of Tikal falls on hard times and is eventually abandoned. Culbert's (1974: 108) reconstruction of terminal occupation at Tikal as being "so impoverished that it became almost a parody of what had been" suggests the consequences of a failure in the economic system. Willey (1974) proposes a variation on this theme that is of special significance since it provides an opportunity to test ideas about the collapse against data from the Middle Classic hiatus. He hypothesizes that the long recognized pause in building and monumental activity that occurs between the Early and Late Classic (ca. A.D. 530-600) represents a "little collapse," or a pre-enactment of events due to the same causes that ultimately led to the complete collapse some 300 years later. Willey postulates that the cause of both events was severance of the symbiotic economic relationships between the lowland Maya and other Mesoamerican civilizations. In the Early Classic the dominant relationship was with Teotihuacan. Willey, following Blanton's (1972) model for the Valley of Mexico, suggests that economic control of the lowlands in the Early Classic was centralized under the domain of Tikal, the principal lowland intermediary for long-distance trade with Teotihuacan. The termination of this interaction after Teotihuacan's destruction was the cause of the hiatus in the Maya lowlands. After the disruption of the hiatus, a reorganized Late Classic society became engaged in more diverse external economic relationships, that, following Webb's hypothesis, ultimately were bypassed and superseded by adjacent societies, spawning a lowland collapse. The question remains, why did the Maya recover from one breakdown in their external economic networks but fail to recover from a similar situation later on? The answer appears to be that by the end of the Classic Period the long distance trade routes were firmly under the control of new mercantile powers based on sea commerce.

Summary

One may summarize the Maya collapse theories according to a model based upon the conclusions of the Maya collapse symposium with additions based upon data made available since 1970:

1) The complexity and growth of Classic lowland Maya society were stimulated by interaction with Teotihuacan, especially at Tikal (Coggins 1975, 1979). Withdrawal of Teotihuacan power from the lowlands precipitated the hiatus (Willey 1974), but also provided the opportunity for independent

development and competition between the Maya centers of the Late Classic. Tikal, for instance, undergoes a revitalization under its Ruler A and his successors (Jones 1977b; Ashmore and Sharer 1975).

2) The lowland elite promoted common training, beliefs, symbols of prestige and authority among themselves, reinforced by increasingly elaborate ceremonialism, to foster cooperation in controlling trade and warfare, and to promote the expansion of their power. These factors also served to increase the social distance between the elite and the various non-elite classes. Fatalistic beliefs in prophecies of change coinciding with the Katun cycle may have contributed to the elite's loss of morale and eventual downfall (Puleston 1979).

3) Continued population growth resulted in increasing pressures upon an already complex and vulnerable subsistence system, as the incidence of malnutrition and disease expanded and productivity decreased. Certain elite responses to the crises, such as accelerated construction of ceremonial structures, may have exacerbated the situation by placing heavier labor demands upon the populace, thus increasing the problems of adequate food production.

4) The traditional long distance trade networks (overland and via river canoe) diminished in importance with the advent of seacoast trade around the Yucatan peninsula. Failure of the established elite to adapt to the changing economic situation led to loss of wealth, prestige and power (Sabloff and Rathje 1975). Several centers, such as Altar de Sacrificios and Seibal were occupied by the new mercantile elite, but were eventually abandoned when these sites lost their importance as trade centers.

The combination of these factors produced a change in the centers of political and economic power, and the lowland populations, including those members of the elite class able to adapt to new conditions, moved to the new power centers located in areas controlled by the Mexican states, or by the new Maya mercantile elite situated in northern Yucatan and along the Gulf and Caribbean Coasts.

A MAYA PERSPECTIVE FOR THE HARAPPAN DEMISE

This paper is based upon the premise that, while the developmental career of each human society is unique, the underlying processes that result in cultural change are often similar. Examples of similar cultural processes invite examination and comparison to thereby increase our understanding of the past. In this way an examination of the demise of the Classic Period Maya Civilization may offer useful insights for scholars concerned with the fate of Harappan Civilization. That is, the analysis of the archaeological evidence from the Indus Valley will undoubtedly reveal examples of factors analogous to those that have been identified as important in the cultural processes of the ancient Maya. This could lead to the formulation and testing of specific hypotheses using the Harappan data.

For example, economic factors such as shifts in ancient trade routes might have played a key role in changes within Harappan society, just as they did among the ancient Maya. Given adequate temporal control, the reconstruction of the ancient Indus economic system, including sources and distribution patterns of resources, along with routes and methods of transport, could reveal changes that correspond to the weakening and abandonment of Harappan sites. Research leading to the delineation of the ancient Indus economic system is already underway, as attested by the recent contributions of several Harappan scholars (Agrawal 1971; Fentress 1976; Possehl 1976; Ratnagar 1977; etc.).

Of course, it may also be beneficial to apply hypotheses based upon factors identified in the Indus Valley to the ancient Maya. For example, Harappan sites were obviously affected by changes in the floodplain environment of the Indus Valley. Flooding and sudden shifts in river channels, albeit on a smaller scale, may have had similar consequences for Maya centers situated in alluvial valleys. A prime case in point would be the site of Quirigua. As a hypothesis it may be proposed that the abandonment of this riverine center was caused, at least in part, by a shift in the course of the Motagua River that left Quirigua isolated from access to its communication and commercial lifeline.

On a very different level, by examining the themes and development of theories concerned with the demise of the Classic Maya, this paper has sought to illustrate a trend visible within all of prehistoric archaeology. That is, the emergence of increasingly sophisticated reconstructions of past cultural processes, including the derivation of testable hypotheses. The issue of the Maya demise began with the assumption that this civilization had suddenly collapsed. The initial search was for a single cause dramatic enough to have triggered such a widespread and sudden failure. After this, the issue was met by proposals of multiple causes, often working in combination, but still sufficient to produce a dramatic collapse. More recent theories have been based upon multiple and subtle, rather than dramatic causes, that produced a more gradual transformation of ancient Maya society. In other words, the basic assumption that Classic Maya Civilization suddenly collapsed has been challenged. The issue, therefore, has shifted from finding causes to the examination of the concept of "collapse" itself.

Erasmus (1968) questioned the appropriateness of the term "collapse" for the Classic Maya over a decade ago, and his insight has been validated by the new archaeological evidence made available during the intervening years. With far more archaeological data in hand, it is now apparent that the abandonment of Classic Maya centers was not sudden, but occurred over one or two hundred years of population decline. Not all these sites declined at the same time, and most significantly, some sites were never abandoned, but continued to prosper through the Postclassic Period. The great regional variations within Classic Maya Culture are also becoming apparent so that the concept of a rise and fall of a uniform civilization has been laid to rest. A more reasonable view would see each Maya center pursuing its own career, so that the causes and timing for its rise and fall were probably unique.

In sum, the Classic Maya appear not to have suddenly fallen apart. Instead, both internal and external processes combined to transform the social, political, economic and even ideological foundations of that society until a reoriented culture, based in areas outside the central lowlands, emerged and prospered during the Postclassic Era. It is hoped that this brief epistomological summary of the development of Maya "collapse" theories may be used as a mirror to reveal similar trends within Harappan archaeology.

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D.P. AGRAWAL

38. The Harappan Legacy: Break and Continuity

INTRODUCTION

THE last sixty years of the Harappan studies have considerably enlarged and enriched our knowledge about the culture. It is now possible to have a holistic perspective of the *process* of the Harappa culture—from its nebulous beginnings amidst the neolithic cultures of the Baluchistan highlands to its present heritage to Indian (Indian in this essay has been used in the sense of the Indo-Pak subcontinent) culture. When one studies the Harappa culture as a process, many new facets become clearer.

In this paper I propose to examine the character of the Harappan civilization; how it originated; what legacy it left; what does the break of the tradition signify. In this review I will also take into account the new evidence that has come to light in recent years. This review is frankly speculative but fully tenable with the newly discovered data.

CHARACTER AND ORIGINS

Recent explorations in Pakistan have thrown new light on the genesis of the early agricultural communities. With the humble neolithic beginnings in Central Baluchistan (Mehrgarh I, Kili Ghul Mohammed I etc.) (Fig. 38.1), the settlements seem to proliferate into adjoining areas with several foci developing uniformity of cultural traits over a well defined region. The following phases can be discerned:

Phase I	:	Central Baluch neolithic cultures
Phase II	:	Several homogenous neolithic groups
Phase III	:	Early Harappa culture
Phase IV	:	Mature Harappa culture
Phase V	:	Late Harappa culture

Both Phases I and II are characterized by a neolithic pastoral-nomadic economy, suited to the highlands, with small rivers, perennial springs, small alluvial tracts for simple agriculture, plenty of grazing grounds for the sheep, goat and cattle. The Mehrgarh evidence clearly shows the development from a hunting-gathering to an animal husbandry mode of subsistence. In Mehrgarh Period I, gazelle (*Gazella*) represent more than 30 percent of the total bones; in Pd. II sheep (*Ovis*) increase to 40 percent, cattle (*Bos*) to <30 percent and deer percentage comes down to >5 percent (Fig 38.2). In Pd. III, cattle reach about 55 percent and sheep come down to 20 percent; but somehow the goat (*Capra*) population does not show much change in different periods (Meadow, 1984).

Extensive explorations in the Upper and Central Indus valley by Mughal (1981, 1982, 1988) and in southwest Sind by Flam (1981) show that these neolithic communities, with increase in population were expanding into the adjoining highlands and crystallizing into distinct culture groups. They were occupying areas near small rivers but more frequently near the perennial springs which abound in the foothills of the Indus Kohistan and Kirthar area. They learnt to harness such water resources by making *gabarbands* (dams) and canals. To the north of their settlements they were making a

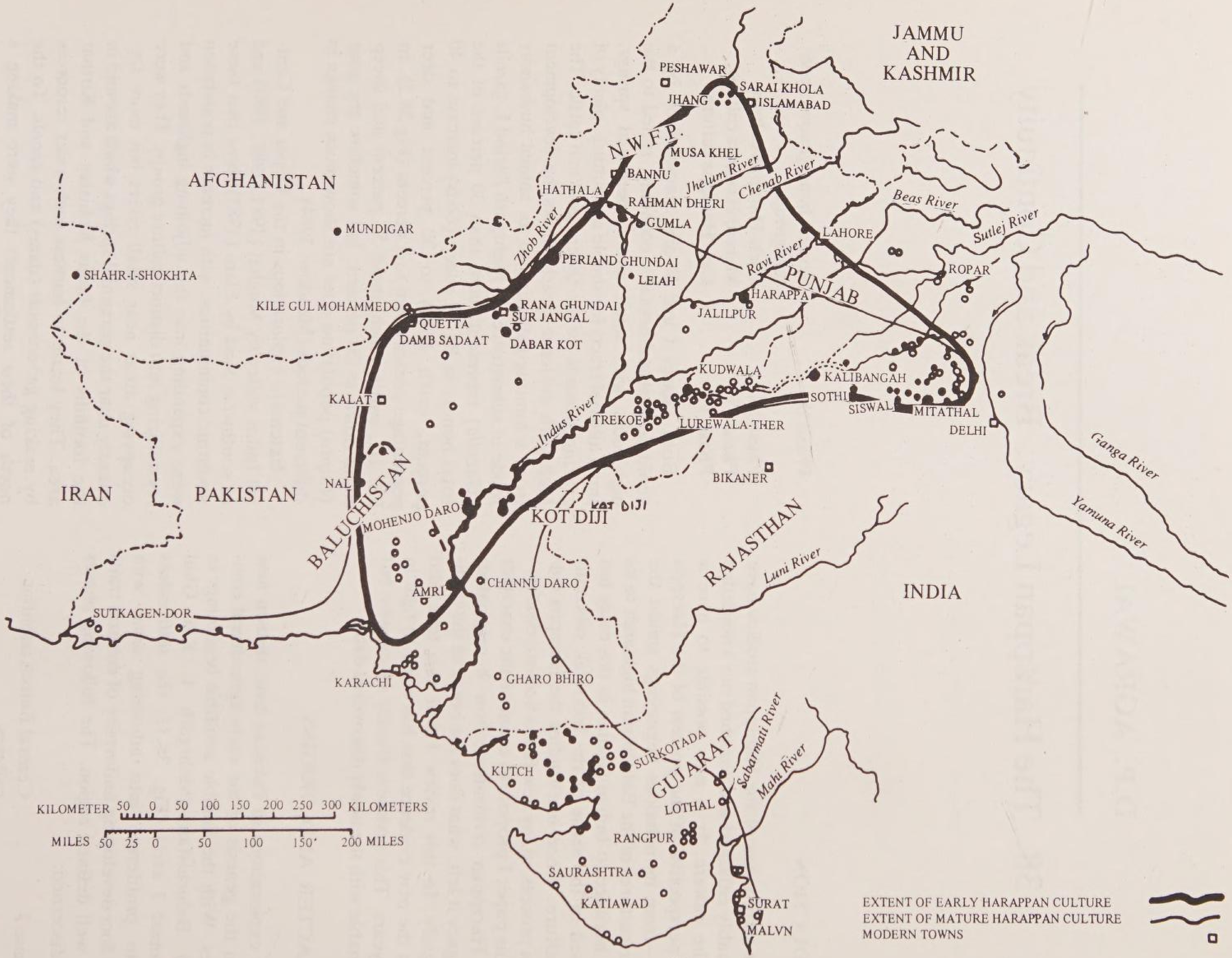
JAMMU AND KASHMIR
PESHAWAR
SARAI KHOLA
JHANG
ISLAMABAD
N.W.F.P.
MUSA KHEL
BANNU
Jhelum River
Chenab River
AFGHANISTAN
HATHALA
RAHMAN DHERI
GUMLA
Beas River
Sutlej River
MUNDIGAR
Zhob River
LAHORE
PERIAND GHUNDAI
LEIAH
Ravi River
ROPAR
PUNJAB
SHAHR-I-SHOKHTA
KILE GUL MOHAMMEDO
RANA GHUNDAI
SUR JANGAL
HARAPPA
JALILPUR
QUETTA
DAMB SADAAT
DABAR KOT
KUDWALA
KALIBANGAH
KALAT
SOTHI
SISWAL
MITATHAL
TREKOE
Indus River
LUREWALA-THER
DELHI
Ganga River
BIKANER
NAL
IRAN
PAKISTAN
BALUCHISTAN
MOHENJO DARO
KOT DIJI
RAJASTHAN
Yamuna River
Luni River
CHANNU DARO
AMRI
INDIA
SUTKAGEN-DOR
KARACHI
GHARO BHIRO
SURKOTADA
KUTCH
GUJARAT
Sabarmati River
Mahi River
KILOMETER 50 0 50 100 150 200 250 300 KILOMETERS
MILES 50 25 0 50 100 150 200 MILES
LOTHAL
RANGPUR
SAURASHTRA
KATIAWAD
SURAT
MALVN
EXTENT OF EARLY HARAPPAN CULTURE
EXTENT OF MATURE HARAPPAN CULTURE
MODERN TOWNS

Fig. 38.1. Map of the northwestern Indo-Pak subcontinent showing distribution of the Early (shown with thick lines) and Mature Harappan (shown with thin lines) zones. Note the major increase in the distribution area between the Early and Mature Harappan is in the coastal zone which probably indicates a significant increase in maritime trade during the Mature Phase (Slide, courtesy Mughal).

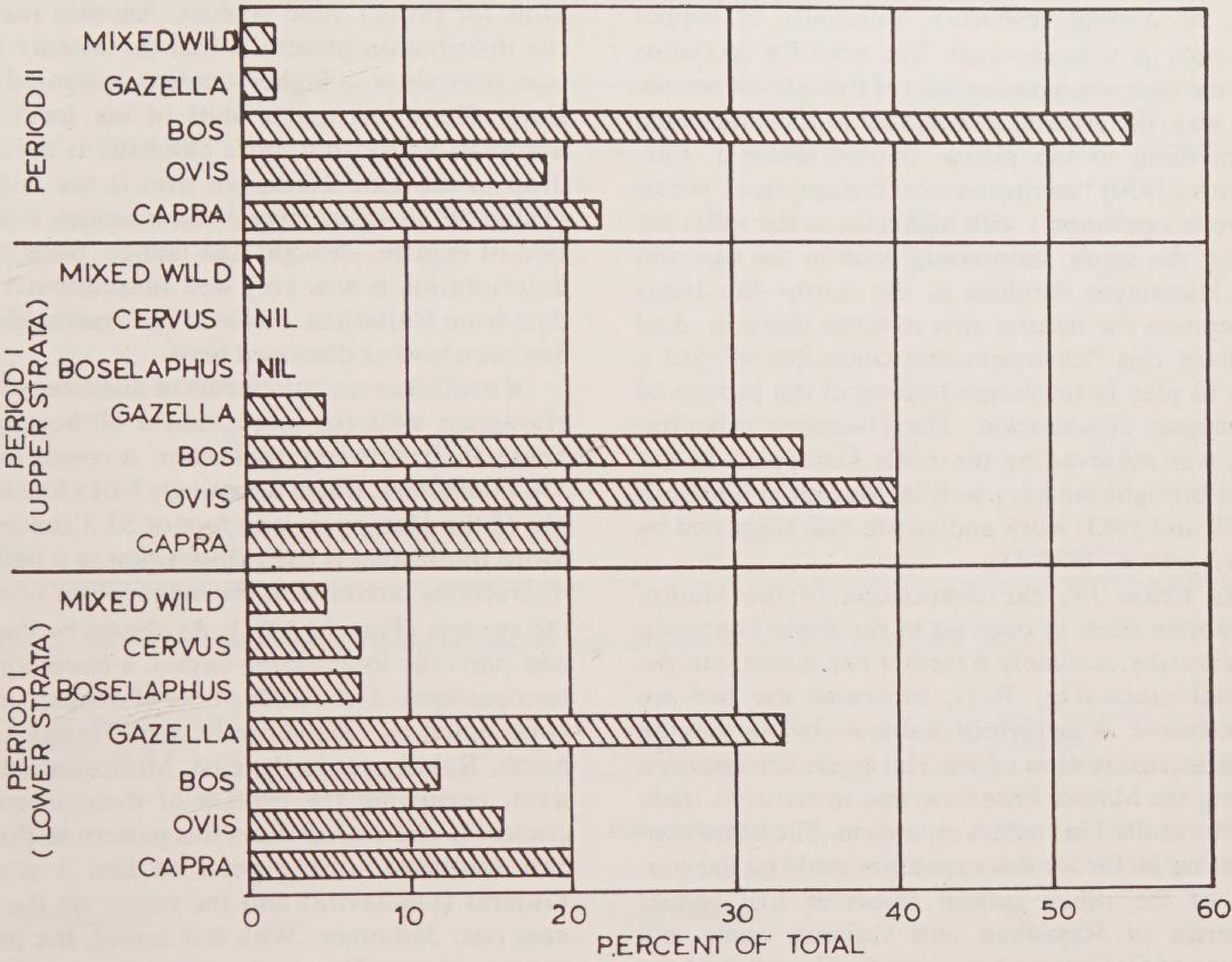

Fig. 38.2. Distribution of wild and domesticated animals from the excavations at Mehrgarh, Kachi plains, Pakistan (after Meadow, 1984). Note the drop in the percentage of deer (*Gazella*) and increase in sheep (*Ovis*) and cattle (*Bos*) between Pds I and II. Cattle show a continuous increase from Pd. I to III; but sheep, after attaining a peak in the Pd. II, declines in Pd. III (After Meadow, 1984).

technologies must have proved useful to them, raised platform probably for their religious buildings. When further increase in population possibly forced them into the Indus valley, some of these technologies must have proved useful to them, though it required much more to harness the mighty rivers of the plains.

In Phase III, these communities moved down into the valley to harness the mighty rivers of the Indus plains; and those that were left behind possibly had a symbiotic role to play by supplying handicrafts, meat and milk products to the urban dwellers of the plains. It is worth noting that Kot Dijian and Amri related sites are on the foothills, except of course Kot Diji itself (Flam, pers. comm.). Cultural homogenization of the large area of the Indus valley was achieved in the Early Harappa phase and it expressed itself as Sothi, Early Harappan, Kot Dijian etc., which basically represented the same cultural entity. But Phase III was a qualitative change (Agrawal, 1972-1973; 1982) from the nomadic-pastoral neolithic communities. Harnessing the mighty Indus river required much more than the neolithic technology of the highlanders. No doubt that technology of dams, canals and high platforms that they built in the highlands was useful but in the Indus plains all these required operations on a gigantic scale. What they needed now was new technologies of annual calendars to predict the flood season, the sowing and harvesting times, knowledge of weather, flood control, irrigation, management of larger settlements, trade, exploitation of natural resources, especially of copper minerals on a larger scale. The need for specialists and the state was a concomitant of these developments. In a way, the growing demand for fertile land would force them to the plains. In this scenario, Carneiro's (1970) "environmental conscription" seems to be in operation : with highlands in the west, the sea in the south, monsoonal *doab* in the east and the Himalayan foothills in the north—the Indus valley was the natural area to settle down in. And perhaps this "environmental conscription" had a role to play in the intensification of the process of Harappan urbanization. The Harappan urbanization was achieved by the Early Harappans as has been brought out very well by Mughal in his thesis (1970 and 1983) work and as was also suggested by me (Agrawal, 1972-73).

In Phase IV, the distribution of the Mature Harappan sites, in contrast to the Early Harappan distribution, is mainly a further expansion into the coastal areas (Fig. 38.1); otherwise the two are coextensive. A fact which makes it obvious that the main intensification of the Harappan urbanization during the Mature Phase was due to maritime trade which resulted in coastal expansion. The other contributing factor for this expansion could be the control of the other natural resources like copper minerals of Rajasthan and Gujarat, agate and timber of Gujarat and the new fertile valley of the Sarasvati. The focus in the Mature Phase seems to be shifting to the eastern side (Cholistan, Hakra/Ghaggar systems).

Mughal's (1988) monumental exploration of the Cholistan area, in Pakistan, has provided a lot of new data to understand the Harappan culture. A study of this new data brings out some salient features. The dependence of the Harappan on the riparian mode of subsistence made them follow the shifting courses of the Sarasvati river. But more important are changes in the character of sites. From a zero level of the Early phase the number of Harappan industrial sites jumped to 45 percent in the Mature Phase. Settlements, of 5-20 hectares, increased from 11 of the Early Harappan to 27 in the Mature Harappan (Table 38.1). Pottery kiln sites however drop from 35 percent of the Early Harappan to 19 percent of the Mature Harappan (Mughal, 1988), which to my mind, suggests that the increased state regimentation and uniformity of pottery forms and motifs required fewer kilns for proper state control. Another feature of the distribution pattern is that the Mature Harappan sites show a higher density compared to the Early Harappan and a shift of the focus to the Sarasvati valley; but more emphatic is the sudden drop in the Late Harappan sites in the last phase (Table 38.2), which may mean a sudden deterioration of climate, drought and famine. Such climatic deterioration is now very well substantiated by the data from Rajasthan, Arabian Sea and the globe, as has been further discussed here.

If one takes measurements of distances of mega-Harappan sites (of more than a 80 hectare size, Table 38.3) between each other, it comes to about 330 kilometers, which temptingly looks like a multiple of the Harappan *long foot* of 33.5 centimeters. More interesting is their disposition in a pattern of intersecting circles with the megapolises occupying the centers (Possehl 1982). As shown by Possehl if one plots the intersecting circles, a fascinating pattern emerges. The center of the Harappan universe is occupied by Ganweriwala; with Harappa in the north, Rakhigarhi in the east, Mohenjodaro in the west, occupying the centers of these intersecting circles. If one extrapolates this pattern to the south and southeast, one expects to find a center in Gujarat (Dholavira) and the other, on the southeast near Jaisalmer. With this layout, the preoccupation of the Harappans with the motif of the "intersecting circles" suddenly acquires more meaning! Moreover, this planning of the layout of the Harappan town on such a large scale, if correctly read, imbues the Harappans with great technological skills for that period of antiquity. The plan looks very sensible : Harappa controls the resources of the hills and the northwestern routes; Mohenjodaro the coastal trade; Rakhigarhi, the eastern trade and the Sarasvati valley; Dholavira, the timber, copper and agate of Gujarat; and Ganweriwala, the federal capital of the Harappans! I have thus introduced some new parameters to Possehl's (1982) domains. One still needs to find a site in Rajasthan to control the copper mining of Rajasthan; that will also complete the intersecting model of the Harappan distribution. To qualify for the status of such megapolises one requires an area of » 80 hectares (See Table 38.3 and also Chakrabarti, 1978). All the sites given in Table 38.3 qualify; but Kalibangan (15 hectares) and Lothal (5

Table 38.1. Size distribution of protohistoric sites in Cholistan (data from Mughal, 1988). (Key H = Harappan; PGW = Painted Grey Ware

Culture	Hakra	Early H	Mature H	Late H	PGW
Set. sites	37	32	50	14	14
Camp sites	52	03	10	13	0
Sites with areas:					
< 5 ha	21	19	45	12	12
5-20 ha	02	11	27	13	01
25-35 ha	04	02	01	01	0
≤ 35 qa	0	0	01	01	0

Table 38.2. Total number of archeological sites in Cholistan region in different periods (after Mughal, 1985).

Approximate age in BC	Culture	No. of sites
4 millennium	**Hakra wares**	99
Early 3rd millennium	**Early Harappan**	40
Mid & late 3rd millennium	**Mature Harappan**	174
Early 2nd millennium and later	**Late Harappan**	50
End 2nd and early 1st millennium	**Post Harappan**	14

hectares) and many others, do not.

With humble neolithic "origins" (in an economic sense) in the highlands, the riparian civilization of the Harappa culture reached its peak in the third millennium B.C. in the Indus valley with its highly urbanized, "industrialized" settlements, with its international trade and exploitation of copper and semiprecious minerals, covering over half a million square miles—and that too in a third millennium context! This was the first grand unification of the

Table 38.3. Area of the main Harappan cities.

Site		Area in hectares
Mohenjodaro	(west)	83
Ganweriwala	(centre)	81.5
Harappa	(north)	82
Rakhi Garhi	(east)	80
Dholavira	(south)	100

subcontinent! In course of time, due to various reasons—waterlogging, invaders, aridification, changes in the river courses etc.—the culture continued to expand eastwards but could not cope up with the alien ecology of the monsoonal forests of Doab and withered on the western fringes of Uttar Pradesh.

CHARACTER

As a large prosperous state, with a fair international trade, it was a centrally controlled government, with its main cities located in strategic positions in an intersecting circle pattern. General layouts, uniformity in pottery forms and motifs, weights and measures, a utilitarian-functional look of the artifacts, betraying neither the intricacy and the splendour of Mesopotamian artifacts, nor the over-ornamentation of Chinese bronzes. But was it so uniform and dull as it is often made out to be? It is obvious that in the Early Harappan phase, it was foreseen that the expansion of the state will be required and that needed a well-thought out plan which should take into account the control of resources of different regions, trade and other routes, administrative ease, perhaps also the cultural divisions. Even today, at Harappa, they speak Punjabi; at Mohenjodaro, Sindhi; at Rakhigarhi, Hindi; in Dholavira, Gujarati etc. Do we see the beginnings of regional diversity in these Harappan provinces? It needs to be emphasized that these cities were laid out afresh, on a clean slate; only then one can lay out a planned city. So the apparent uniformity is also an artifact of the centrally planned character of the Mature Harappan state.

But the diversity was there; has always been there in the subcontinent. The very organisation of the Harappan state into so many provinces, to my mind, envisages a recognition of the diversity. Archaeological record has its own limitations in reflecting such diversity. Observing the deserted camp sites in modern Cholistan, they all look alike—so dull and so uniform. But once one sees their living settlements, their clothes, carpets, jewellery, wood and leather work, decoration of the mud walls, rituals and customs—one gets the visual impact of their rich diversity. So, though much of the diversity may have been lost in the archaeological record, there is still enough which is there to see and appreciate without stretching out imagination. In a different sense, Allchin (1982) also recognizes this diversity.

Let us have a look at the recorded diversity. The cult (?) figurines of Sind are not to be found in Rajasthan and Lothal. The fire altars of Kalibangan (Pl. 38.1) and Lothal are so different from each other. Even the layouts of the major Harappan towns are quite different; there is considerable difference in even the use of building material. In Surkotda the two parts of the settlements are within one enclosure. Lothal presents a different pattern than anywhere else.

In burial customs again, there is quite a bit of diversity. At Kalibangan, there are three types of burials: urn type secondary burials (Pl. 38.2); extended inhumation; and ceremonial burial without any skeletal remains. In Ropar, the burials are placed northwest-southeast, instead of the usual north-south. In Rojdi, which has been extensively studied by Possehl and Weber (pers. comm.) for its plant remains, there is a total emphasis on millets (*Eleusine coracana, Sorghum, Panicum, Setaria,* etc.); wheat is absent and barley shows up only a little in the beginning and vanishes from the record later on. Even in small items like etched beads, it is interesting to note that a typical motif of concentric circles is quite characteristic of Rojdi. These are a few examples of the expected regional variations. Once computer archaeology acquires greater momentum (the Deccan College has already set the trend), it will be easy to compare and contrast data bases of cultural assemblages of the different regions.

A very consistent suite of ^{14}C dates from Rojdi indicates that it is a contemporary of the Mature Harappan of Sind but it provides a different cultural assemblage than one would expect of a typically Harappan site (Possehl and Herman, 1990) and therefore they call it *Sorath Harappan.* I would rather call it *Sorath culture* which evolved out of the local roots. Whether these roots go back to the Pre-Prabhas or some other Neolithic culture needs to be explored. On this culture, the Mature metropolitan Harappan impinges as they are contemporary. This regional personality will be shown better at sites like Rangpur and Rojdi, rather than at Lothal which as a port town must have been part of a larger network of trade and therefore may show more Harappan links. The fact that earlier workers gave very contradictory and conflicting labels to Rangpur assemblage—ranging from "late" to "post"—to "non-Harappan" is clearly indicative of the fact that the culture had its own individuality. When the metropolitan centers like Mohenjodaro collapsed, due to whatever reasons, Saurashtra provided them a refuge, an outlet. As a result, there is an intensification of urbanization and population increase witnessed in Rojdi C than A.

The Harappan cultural tradition, with its diversity and uniformity, continued for a long time and probably laid the basic substratum of the present day Indian Civilization. But towards the last quarter of the II millennium B.C., a drastic change is writ large all over the Harappan zone.

THE BREAK

With recent research, it is becoming clearer that new elements are making their appearance and they are not localized. The Cemetery-H and Jhukar are no more localized aberrations but occupy large areas. In the north, the Phase IV is characterized by Cemetery-H and in the southwest, by Jhukar. At Jhukar, which was excavated by Mughal in 1974, there is a clear cultural overlap and co-mingling of cultures; and in the artifacts new tastes, but perhaps the old artisans, seem evident. At Jhukar now the goblet is painted with Jhukar motifs. So if one is looking for elements in the archaeological record of new people, the Jhukar and Cemetery-H cultures with their larger distribution are now eligible to be claimants for that title.

In the last quarter of the II millennium B.C., in the valleys of Sarasvati, the population thins down drastically (Table 38.2). A bit later, iron starts appearing; so do the gray wares. Rice, pig and buffalo become prominent in the subsistence record. In the Chalcolithic cultures, lentils and leguminous plants appear and assume importance in the diet; they were conspicuous by their absence in the Harappan record. The literate tradition breaks; no script anymore. Use of ground water and wells is given up, along with the burnt bricks. No more planned towns; in fact, no more towns. The ones that were there lose their character and population. It does not mean that populations were decimated, but with lack of control from the metropolitan centers, the provincial towns degenerated and changed. Pande (1987) in a very interesting article points out that cultural items of everyday life of the Mature Harappans disappear in later cultures: antimony rods, terracotta masks, weights and measures, metal pots and pans, even some motifs like knot designs. For the first time, the *lota* and *thali* are introduced in the Indian crockery by the Kayatha culture and continue to this day. Now burials come right into the houses: the dead of the Chalcolithic cultures are buried below the house floors, unlike the Harappan cemeteries located outside settlements.

More significant is the curious fact that many of the Harappan items (e.g., burnt bricks, wells, masks, antimony rods, even the knot design, script, of course of a new one) reappear with the second urbanization in the Northern Polished Ware times in north India. (Did these artifacts in some way symbolize the state?) These markers, in diet, in subsistence, in script and literate tradition, in daily items of use, which suddenly disappeared after the Harappans, are obviously conveying the message that the cultural tradition broke down. To my mind, it signifies the advent of a new people who were now the new rulers and dictated new fashions. The break of tradition is writ large on the evidence.

There were many causes of the Harappan decline: aridification (for which there is now impeccable data from Rajasthan (Agrawal 1982b; Wasson et al., 1983, 1984; Cohmap, 1988) and elsewhere from India and globally too; waterlogging in the Indus; tectonic disorganization of perennial rivers like the Sarasvati and their eventual drying up (Agrawal and Sood, 1982); the inability of the Harappan culture to cope up with a monsoonal ecology of the Doab; and finally, and culture at some stage has to die out. The process of birth, growth, decay and death governs organisms as well as cultures. But a pressure from the western flank, which was pushing the Harappans to the east and the break of the tradition, as argued above, does suggest a role of some invaders who finally prevailed. Who they were, will remain a bit controversial unless some definitive evidence turns up to identify such new people. One more point needs to be mentioned here: all the foreign languages in India were brought by invaders e.g., English, French, Portuguese, Arabic and Persian, Greek and Scythian. Who brought the Indo-Aryan?

Gordon Childe (1979) in his classical definition of the state and civilization had prescribed many criteria: class stratification; monumental architecture; cities; kingship; full time craftsmen and smiths; stylized art and architecture; writing; international trade; science and technology etc. All these criteria show that the subcontinent did not have a civilized state after the collapse of the Indus Civilization till the rise of the Ganga Civilization in the First Millennium B.C. And therefore many of the traits which were lost with the Harappans are revived with the rise of the Ganga civilization. And this explanation may help us understand some traits that vanished but reappeared again in the middle of the First Millennium B.C. This again shows that the period between c. 1700 and 600 B.C. may not have been dark but it certainly was a regression. From the state the society went back to chiefdoms. Between the distinctly organized societies of the Harappans and of the Ganga civilization, the interregnum was perhaps a bit of chaos and disorganization. Can this be explained by the coming of the Barbarians!

Rulers come and go and the elite changes with new regimes; but the people continue. And so do the local cultural traditions. Despite the break, the Harappan legacy continues.

THE LEGACY

In a traditional society like ours, hoary traditions continue along with newly acquired fashions and technologies. A closer look clearly shows an old, Harappan sub-stratum, on which the edifice of the present Indian culture stands. Let me recapitulate and re-emphasize some of these cultural traits.

The (Hindu) religion is basically iconic and not animistic as that of the Aryans. The *pasupata, yogisvara, trimukha* aspects of the famous seals (Pl. 38.3) have been identified as proto-*Siva*, or even proto-*Mahisa*, (Hiltebeitel, 1978) and to me it appears to be a strong evidence. The nandibull worship has to be traced to the Harappans and perhaps the sacredness of the cow too. Some of the seals suggest animal sacrifice, so does the terracotta cake from Kalibangan (Pl. 38.4). The linga worship can only be traced to the Harappans, even if the phallus-like objects are few and some scholars do not believe that the proto-Siva seal shows an ithyphallic god. The importance of pipal (*Ficus religiosa*), swastika, and water ablutions in today's religion can be traced back to the Harappan preoccupation with water rituals (the Great Bath, the associated water structures with the Kalibangan fire altars, the row of bathing platforms at Lothal etc.) and the emphasis on the pipal motif do suggest a continuity of the religious beliefs. The enigmatic terracotta figures do suggest yoga-like postures (Rao, 1973).

In a third millennium context, when communication and transport must have been difficult, the credit for unifying the north and west of the subcontinent goes to the Harappans. They were the first to achieve this unification of a society with so much of diversity. The location of their main metropolitan towns in a peculiar network of intersecting circles may have provided impetus for travel to these far-flung areas of the state. In later times, it was achieved by locating the main pilgrimage centers at the farthest points of the country: from Amarnath and Badrinath in the north, Dwarka in the west, Puri in the east, to Rameshwaram in the south.

Even secular objects like the typical Harappan house plan of a central courtyard surrounded by rooms (it has been found by air-conditioning experts to be best suited for Indian climate) seems to have continued from the Harappan times. The binary system of weights of the Harappans followed 1, 2, 4, 8, 16, 32, 64, ... 12800, with fractions in one-thirds. Till recently, the Indian 1 seer = 16 chattacks and 1 rupee = 16 annas basically followed the same system. Even the *Arthasastra's angula* of 17.86 millimeters seems to have been derived from the Harappan measuring unit of 17.7. millimeters. What the present Indian culture owes to the Indus Civilization will perhaps never be known fully as the intangible heritage that we got from the Harappans can never be fully traced to their Harappan origins, unless one day one finds long decipherable texts of the Harappans.

CONCLUSIONS

In this paper I have tried to take a holistic view of the Harappan tradition and legacy and what such a view tells us in terms of the subcontinent's past. The approach used in that of *pattern recognition* and not analytical. In presenting my case, I have steered clear of the usual controversies (they are well known and I need not repeat them here). I have tried to delineate the personality and character of the Harappa culture, tracing it from its nebulous origins and its spread, and what it bequeathed to the latter-day Indian culture; as also the break in this tradition at the close of the II millennium B.C. and what it could mean in terms of coming of the new people in to the subcontinent.

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PART VI

NEW EXCAVATION REPORTS

LOUIS FLAM

39. Excavations at Ghazi Shah, Sindh, Pakistan

DURING his archaeological explorations of western Sindh in the winter of 1930-31, N.G. Majumdar (1934: 79-86, 95-103) discovered and excavated the prehistoric site of Ghazi Shah. Majumdar's excavations at Ghazi Shah, two trenches and four "pits," revealed a cultural sequence similar to that discovered at the type-site of Amri: exclusively Harappan levels, followed by levels with a mixture of Harappan and Amrian artifacts, and beneath these an early Amri occupation. Ghazi Shah was thus established as an important location of both Amrian and Harappan cultural occupations, but that was all that could be established from the limited work at the site, although Fairservis (1971: 173) endeavored to remedy this situation through a careful study of Majumdar's published results. In 1985, the Sindh Archaeological Project, under the author's direction began new excavations at Ghazi Shah and the following is a brief account of some of the findings of the research.

SITE AND LOCALITY

Ghazi Shah is located approximately 1.5 kilometers east of Pir Ghazi Shah village in the northernmost portion of the Kohistan region 26° 27′ N 67° 28′ E (Pl. 39.1 and 39.2; Figs. 39.1, 39.2 and 39.3) of western Sindh Province, Pakistan. The form of the site is a single mound, presently two hectares in area, with a maximum height of eleven meters above its surrounding plain.

The site is situated on the alluvial, cover floodplain of the Naing Nai, an ephemeral stream originating approximately fifty-five kilometers to the south (the *nai* uniquely flows from south to north). For most of its course the Naing Nai has a perennial but low discharge derived from the influent flow of spring water into its channel. This rivulet becomes dry several kilometers south of Ghazi Shah, rendering the alluvial plain dry at the latitude of Ghazi Shah for almost the entire year. However, heavy summer rainfall (July-August) in the catchment of the Naing Nai turns the latent stream into a torrent. During this brief period the *nai* sheet floods a five kilometer breadth between Pir Ghazi Shah (on its left bank) and the village of Tori (on its right bank). A summer crop (*kharif*) of *jowari* and *bajri* is usually grown on the basis of this floodwater.

The primary source of water for Pir Ghazi Shah is a perennial spring located aproximately four kilometers west of the village in the Bhit Range of Sindh Kohistan. The Bhit Range reaches a height of 397 meters above sea level at the latitude of Pir Ghazi Shah and exhibits a north-south strike. A conspicuous transverse fault marks the location of the spring, while calcareous tufa deposits from the spring have created a prominent and large hill over which the water has flowed for thousands of years. After cascading over the tufa hill the spring's channel winds its way through the lower, outer hills of the Bhit Range and emerges onto the Naing Nai alluvial plain at Pir Ghazi Shah. Presently, about eighty hectares of land are cultivated by utilizing the spring water is directed to agricultural fields by simple irrigation channels. An incised channel from

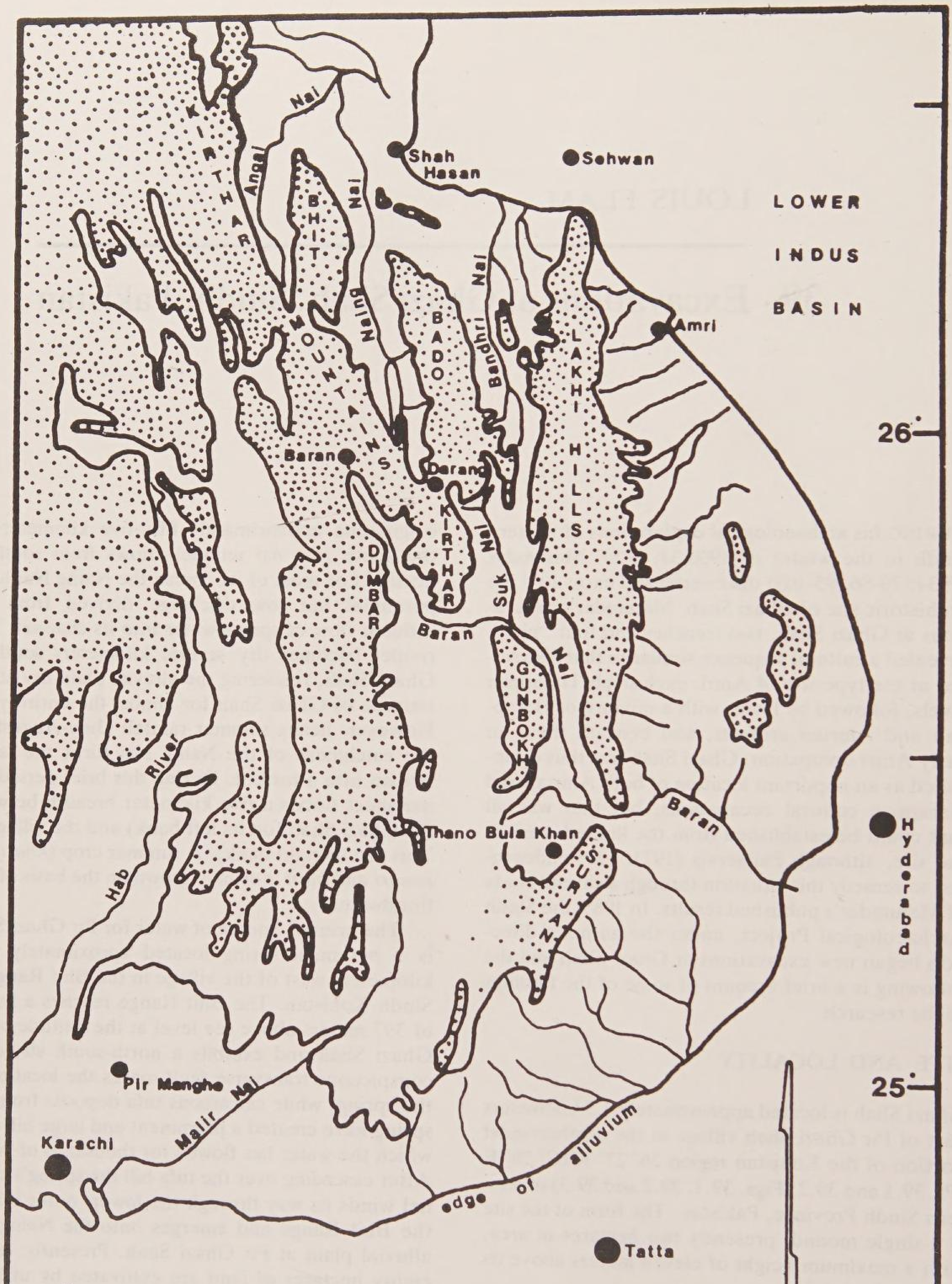

KIRTHAR
Angai
Nai
Shah Hasan
Sehwan
LOWER INDUS BASIN
BHIT
Nai
MOUNTAINS
Naing
BADO
Nai
Bandhri
Nai
LAKHI HILLS
Amri
26°
Baran
Daran
KIRTHAR
DUMBAR
Suk
Nai
Baran
GUNBOKH
Baran
Hab River
Thano Bula Khan
SURJAN
Hyderabad
25°
Pir Manghe
Malir Nai
Karachi
edge of alluvium
Tatta
67°
68°
N

Fig. 39.1. Sindh Kohistan

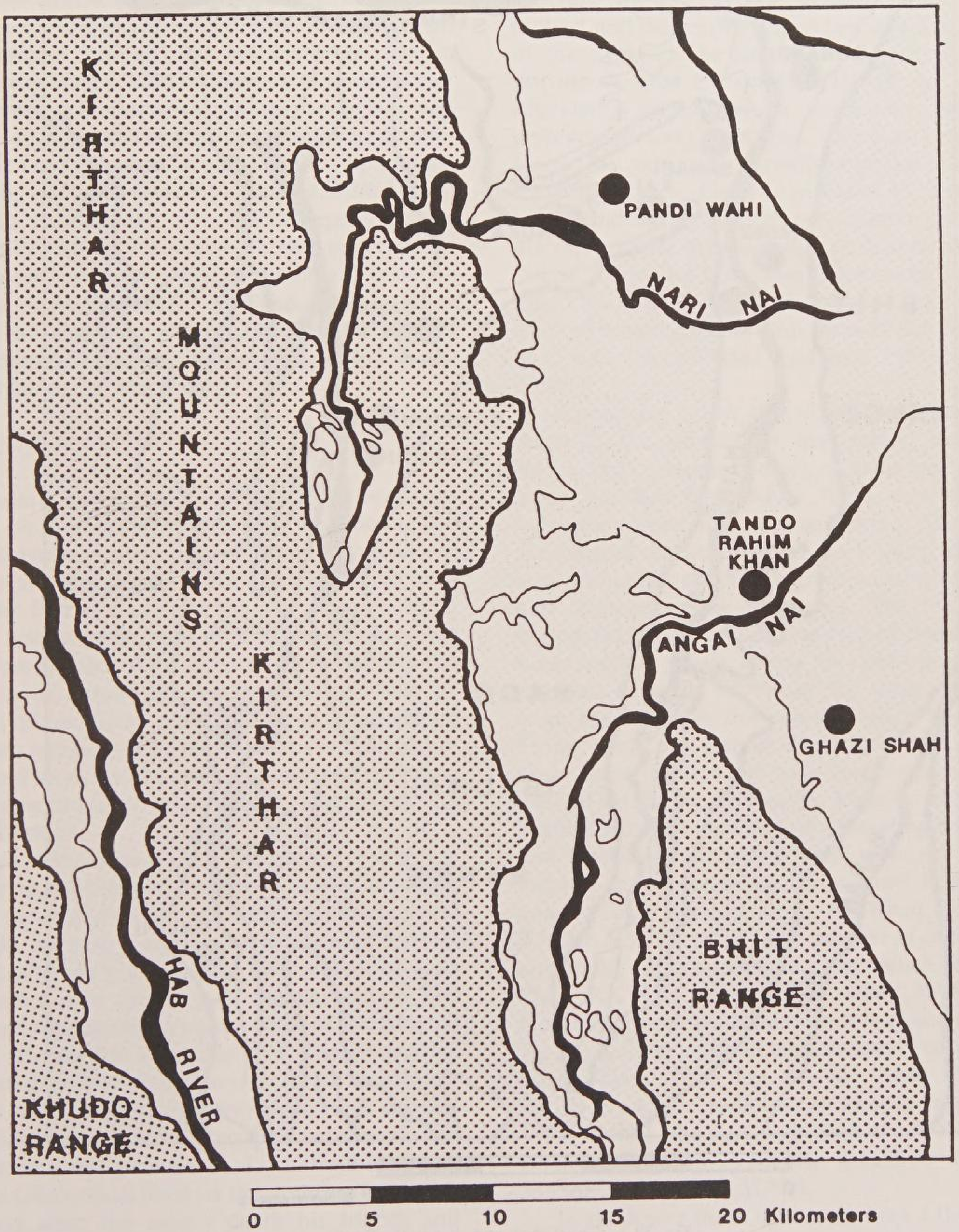

KIRTHAR
MOUNTAINS
KIRTHAR
PANDI WAHI
NARI NAI
TANDO RAHIM KHAN
ANGAI NAI
GHAZI SHAH
BHIT RANGE
HAB RIVER
KHUDO RANGE
0
5
10
15
20 Kilometers

Fig. 39.2 Ghazi Shah and sites to the north

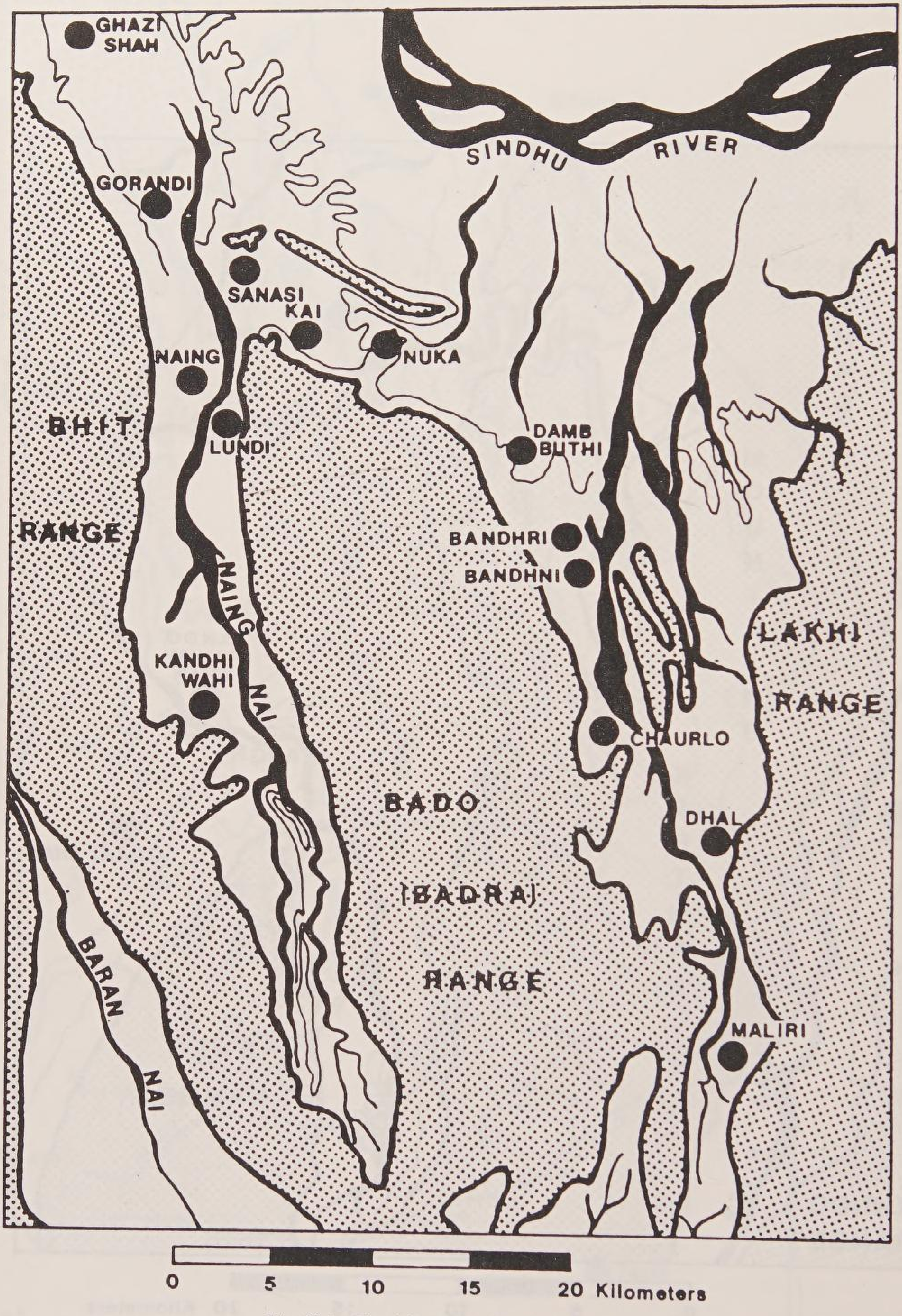

GHAZI SHAH
SINDHU RIVER
GORANDI
SANASI
KAI
NUKA
NAING
BHIT
LUNDI
RANGE
DAMB BUTHI
BANDHRI
BANDHNI
NAING NAI
KANDHI WAHI
LAKHI
RANGE
CHAURLO
BADO
DHAL
(BADRA)
BARAN
RANGE
MALIRI
NAI
0
5
10
15
20 Kilometers

Fig. 39.3. Ghazi Shah and sites to the South

Pir Ghazi Shah to the archaeological site indicates that the spring's flow followed a path directly to Gahzi Shah in the past.

In the arid/semi-arid environment of western Sindh, Ghazi Shah was in a unique position. With mean annual rainfall 100 millimeter or less, a winter crop (*rabi*) could be grown with spring water on the very rich alluvial soils of the Naing Nai, and summer floods provided the opportunity to double-crop the land. The spring also supplies a perennial source of water for human purposes and for animal watering and washing. The Bhit Range is also an excellent source of stone construction materials for the foundations and walls of buildings. Just five kilometers to the north, at Tando Rahim Khan village, an east-west passage through the Kirthar Mountains into Baluchistan can be achieved via the Angai Nai torrent channel.

NEW EXCAVATIONS

Majumdar's excavations at Ghazi Shah were conducted on the northern portion of the mound. The new excavations were placed on the northwestern portion of the mound, with one objective to integrate the former finds into the new research at the site. It was intended that excavations begin on the flat, topmost part of the site and proceed down the slope of the mound beyond the skirt and into the alluvial plain. Time and funding were depleted after two and one-half excavation areas were completed and work had to cease. The three excavation areas descended to the middle portion of the mound's slope.

Area 1 measured six by five meters and was located on the flat, top-most portion of the mound. It was excavated to a depth of 50 centimeters and revealed cultural materials of the Islamic period. Structurally, only a thin, narrow remnant of what was once a mud (pise?) wall was uncovered. The finds included several copper coins of the Mughal Period (the author is grateful to Pakistan's leading numismatist, Abdullah Waryah, for their identification), Islamic glazed pottery, iron rings and unidentifiable iron pieces, a copper arrowhead, and shell, stone, and glass beads. Local tradition holds that Pir Ghazi Shah lived on the prehistoric mound, and that after the saint's death his friends and followers continued to inhabit the site (Pyar Ali?; cf. Majumdar 1934: 79-80).

Excavation Area 2 was adjacent to Area 1, and was separated from it by a one meter wide baulk. Area 2 was six meters wide; its length began at the juncture of the flat and sloping aspects of the mound and descended ten meters down the incline of the mound. The first three meters, the upper portion of Area 2 (Loci I, II, III, IV, V, VI, VII) revealed a series of walls comprising two clearly delieneated loci, or rooms. The first, designated Locus II, was only partially exposed within the excavation area. Finds from Locus II were sparse but included typical Harappan pottery, shell and discoid steatite beads, a fine terracotta triangular "cake," and the body sherd illustrated in Figure 38.4 (Number 1). Two radiocarbon samples provided calibrated dates for this locus of the site: 2915-2635 B.C. (Beta 33358), and 2425-2160 B.C. (Beta 33357).

Proceeding down the slope of the mound in Area 2, the subsequent four meters excavation uncovered a number (nine) of stone wall foundations (cf. Kot Diji, Khan 1965) none of which turned a corner, nor were connected. This part of the mound descends quickly at a sharp angle and was probably subject to a great amount of erosion and damage to the structures. The foundations varied from one to four courses of stone, oftentimes with a single course of mud-brick, or the remnant of such, on top of the stone. The finds from the strata in this sub-area were interesting. Stone, shell, and steatite beads were found as well as a lapis lazuli bead with small steatite beads pushed inside the perforation holes on either side, probably from a necklace of alternating lapis lazuli and steatite beads. Also found were several perforated terracotta disks, large sized incised clay beads (Casal 1964: Fig. 122, 1-3; Khan 1965: Plate XXIXb, 15, 16, 18), a large number of chert blades and tools, and a number of stone balls (Casal 1964: Plate XXVIIIA; Khan 1965: Plate XXXI, 1-4). Notable pottery from this sub-area (Loci VIII, IX, X, XI) included a small Kulli cup and "corrugated" bowls (Casal 1964: Fig. 62, 201; Khan 1965: Fig. 22, 7). A single radiocarbon sample from Locus VIII, Unit 2 (the Kulli cup cited above came from Locus VIII, Unit 3) yielded a calibrated date of 3365-2925 B.C. (Beta 32804).

In the lower three meters of Area 2 the mound slopes much more gently. Excavations (Loci XII, XIII, XIV, XV, XVI XVII) revealed seven mud-

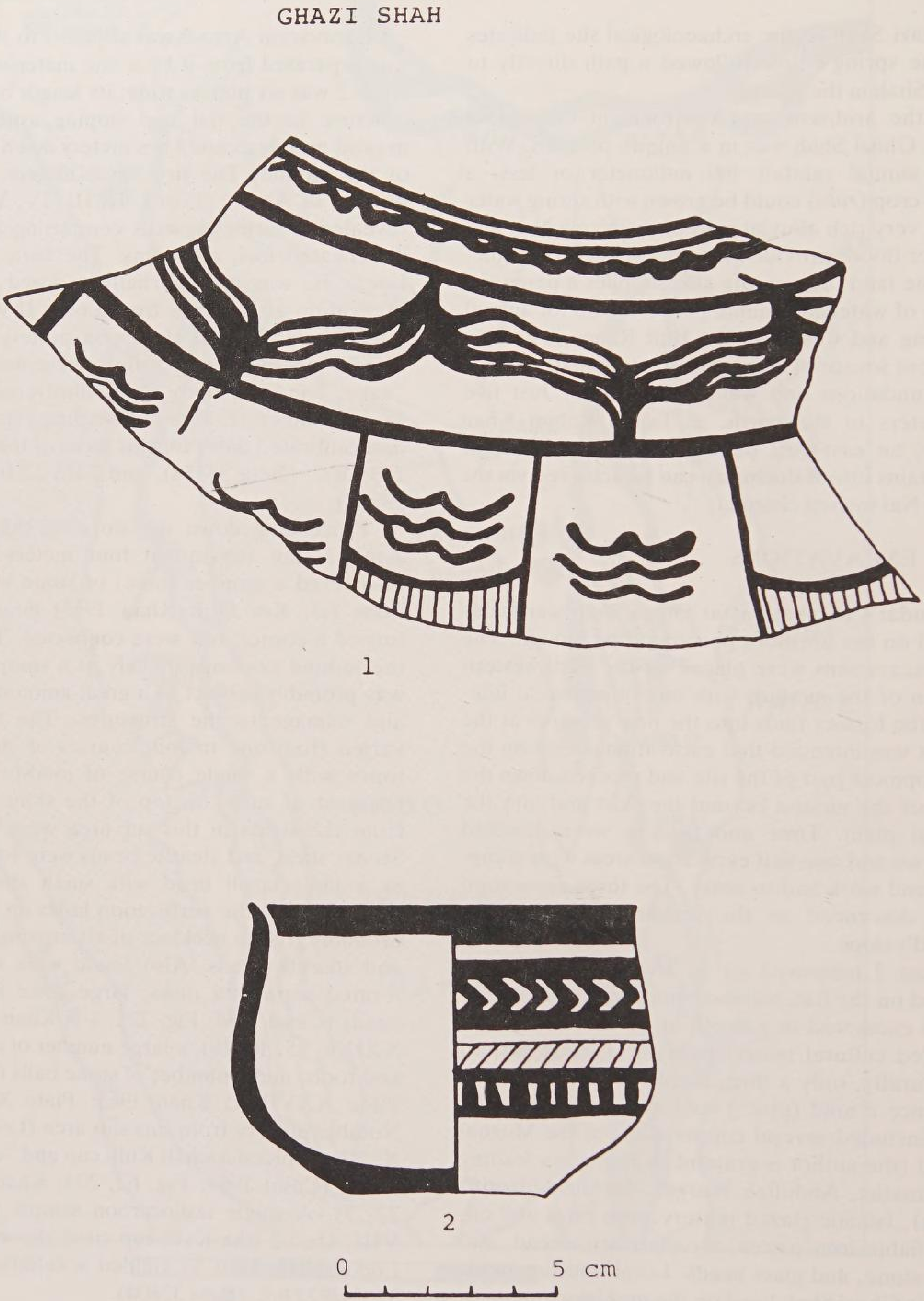

GHAZI SHAH
1
2
0
5 cm

Fig. 39.4. Amri pottery, Ghazi Shah

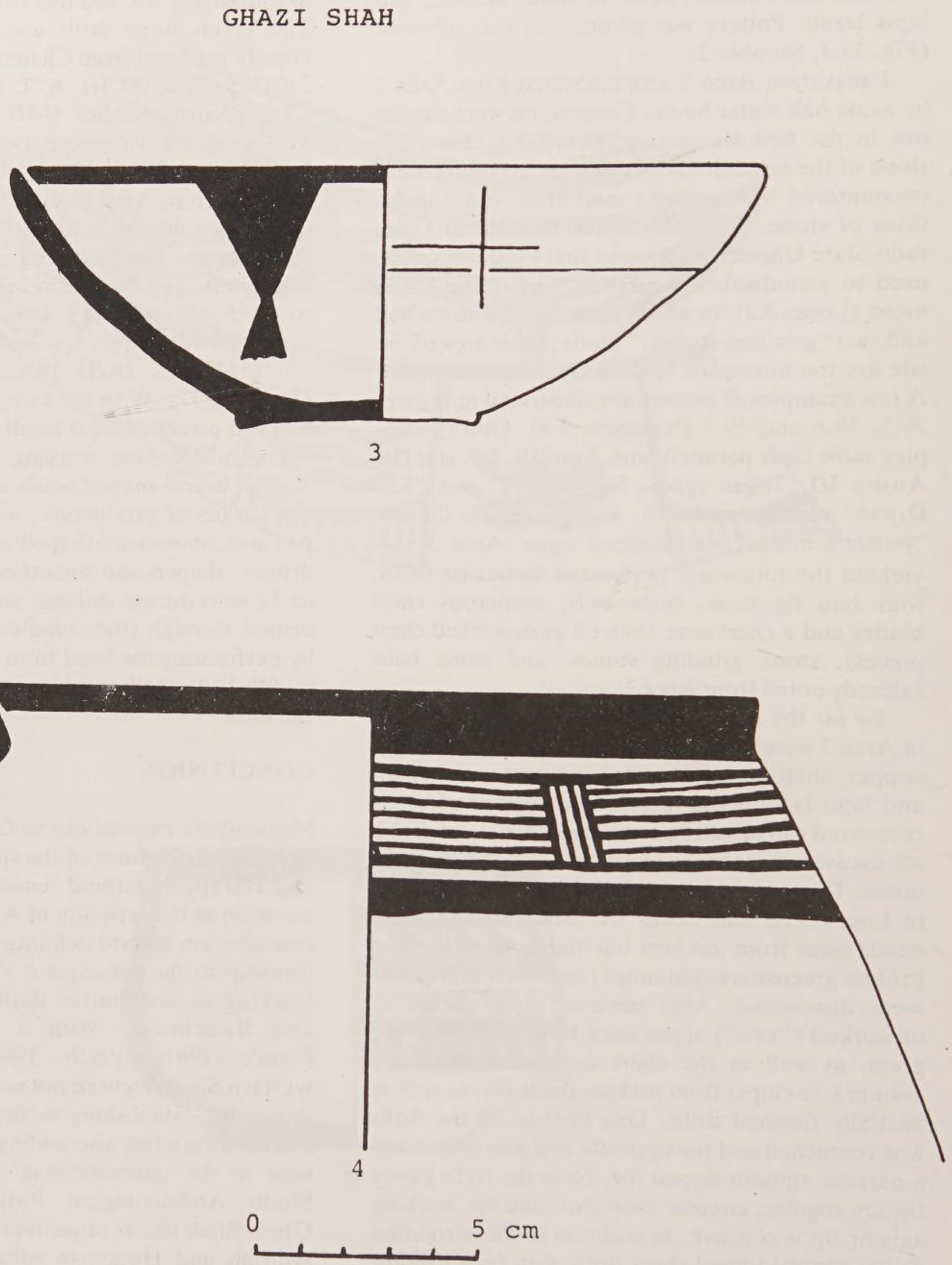
brick walls on stone foundations enclosing two loci, or rooms (Locus XIII and Locus XVI). Finds included chert blades, beads of stone, steatite, and lapis lazuli. Pottery was plentiful in this sub-area (Fig. 39.4, Number 2).

Excavation Area 3 was separated from Area 2 by a one-half meter baulk. Excavations were carried out in the first six meters (Loci I-Xa) down the slope of the mound. Clearly delineated rooms were encountered with walls of mud-brick and foundations of stone. Soil analysis (carried out at Colorado State University) showed that local clays were used to manufacture the bricks. One room had a niche (Locus Xa), in which were found a stone ball and two "grinding-stones." Finds in this area of the site are too numerous to detail in this brief report. A few examples of pottery are illustrated in Figures 39.5, 39.6 and 39.7 (Numbers 3-9). Other examples show clear parallels with Amri IB, IC, and ID, Anjira III, Togau types, Nal pottery, and "Kot Dijian" corrugated bowls. Several vessels showed "potter's marks" or inscribed signs. Area 3 also yielded the following: perforated terracotta disks, four bull figurines, bone awls, numerous chert blades and a chert core (as well as unworked chert pieces), stone grinding stones, and stone balls (already noted from Area 2).

By far the most surprising and interesting finds in Area 3 were the number of beads. Beads made of copper, shell, terracotta, steatite, agate, carnelian, and lapis lazuli were found. The number of beads recovered can be attributed to the practice of sifting all excavated matrices (soil) through 3 millimeter mesh. This procedure produced spectacular results in Locus VIII and Locus IX. Not only did many beads come from this area but numerous whole and broken greenstone (phtanite?) and chert bead drills were discovered. Also retrieved were pieces of unworked ("raw") stone used to manufacture the green as well as the chert drills, debitage (tiny 1-4mm size chips) from making the drills, as well as partially finished drills. One portion of the drills was retouched and the opposite end was finished to a narrow, smooth-tipped rod. Near the rod's glossy tip are regular, circular striations, and the working axis or tip is concave. In addition to these rod-like drills, conical-tipped chert drills with broad shoulders made from flint blades or retouched flakes were recovered. The small working part of the chert drills indicate they were used for making small perforations. Possibly these were used to counter-drill, or "begin" the holes of the bead prior to employing the rod-like drill bit and a bow drill. The green stone drills are similar to those previously reported from Chanhu Daro (Mackay 1943: 210-213; Plate XCIII, 6, 7, 8; Plate LXXXVIb, 8 a-h), Shahr-i Sokhta II-III (Piperno 1973), and Mehrgarh III 3 (Jarrige 1982: 83 and Plate 6.13; Lechevallier 1984: 46 and Fig. 7.3, 3). A further example from Amri (Casal 1964: 152, and Fig. 121, 6) can possibly be added to the finds of the green stone drills. The examples from Amri came from Periods IC and ID, radiocarbon dated (calibrated) to 3375-3020 B.C. (TF 863). At Ghazi Shah two radiocarbon samples resulted in calibrated dates of 3375-3145 B.C. (Beta 18536) and 3370-2970 B.C. (Beta 18537). With the bead drills were found unworked pieces of lapis lazuli and agate, along with the debitage from working the agate into beads. Agate, barrel-shaped beads were recovered in various stages of production: roughly shaped; shaped out not smoothed; shaped and smoothed but not drilled; shaped and smoothed and partially drilled or broken during drilling; shaped, smoothed, and drilled through (the completed hole was achieved by perforating the bead from both ends towards the middle). A small polishing stone was also found in the area.

CONCLUSION

Majumdar's excavations at Ghazi Shah brought to light the importance of the site both for its Amrian and Harappan cultural remains. Casal's (1964) excavation at the type-site of Amri was a tremendous contribution toward defining Amri culture, its relationship to the subsequent Harappan culture, and tracking its distribution throughout western Sindh and Baluchistan. With a broader perspective, Flam's (1981a, 1981b, 1986) reconnaissance in western Sindh focused not only on the material evidence for establishing settlement patterns for the Amri culture but also adding an ecological dimension to the understanding of Amri culture. The Sindh Archaeological Project's excavations at Ghazi Shah has as objectives a clearer definition of Amrian and Harappan cultural adaptations (respectively) in the mountainous, western portion of the Greater Indus Valley, establishing a more accurate and finer chronological framework for these



GHAZI SHAH
3
4
0
5 cm

Fig. 39.5. Amri pottery, Ghazi Shah

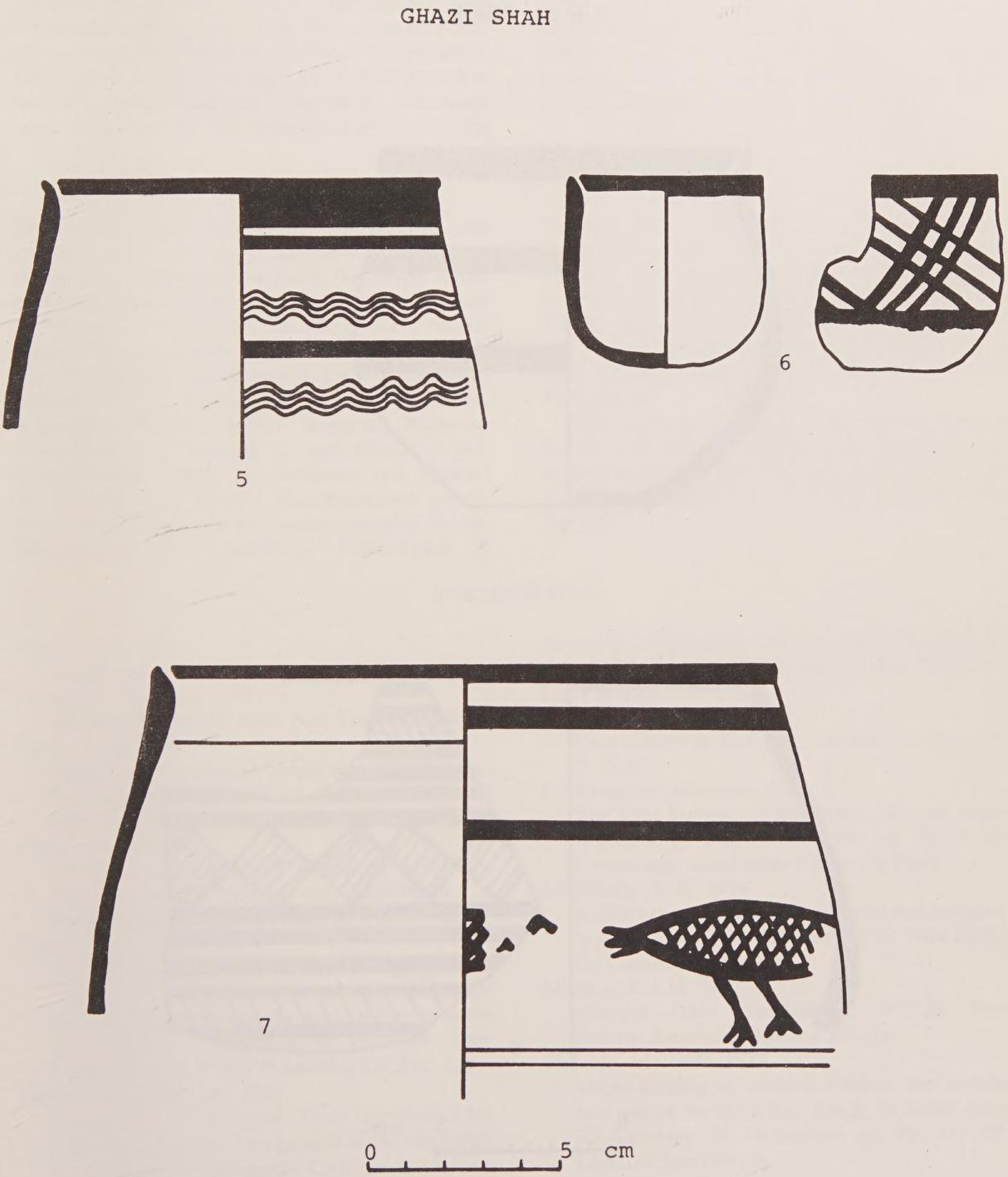

GHAZI SHAH
5
6
7
0
5 cm

Fig. 39.6. Amri pottery, Ghazi Shah

GHAZI SHAH

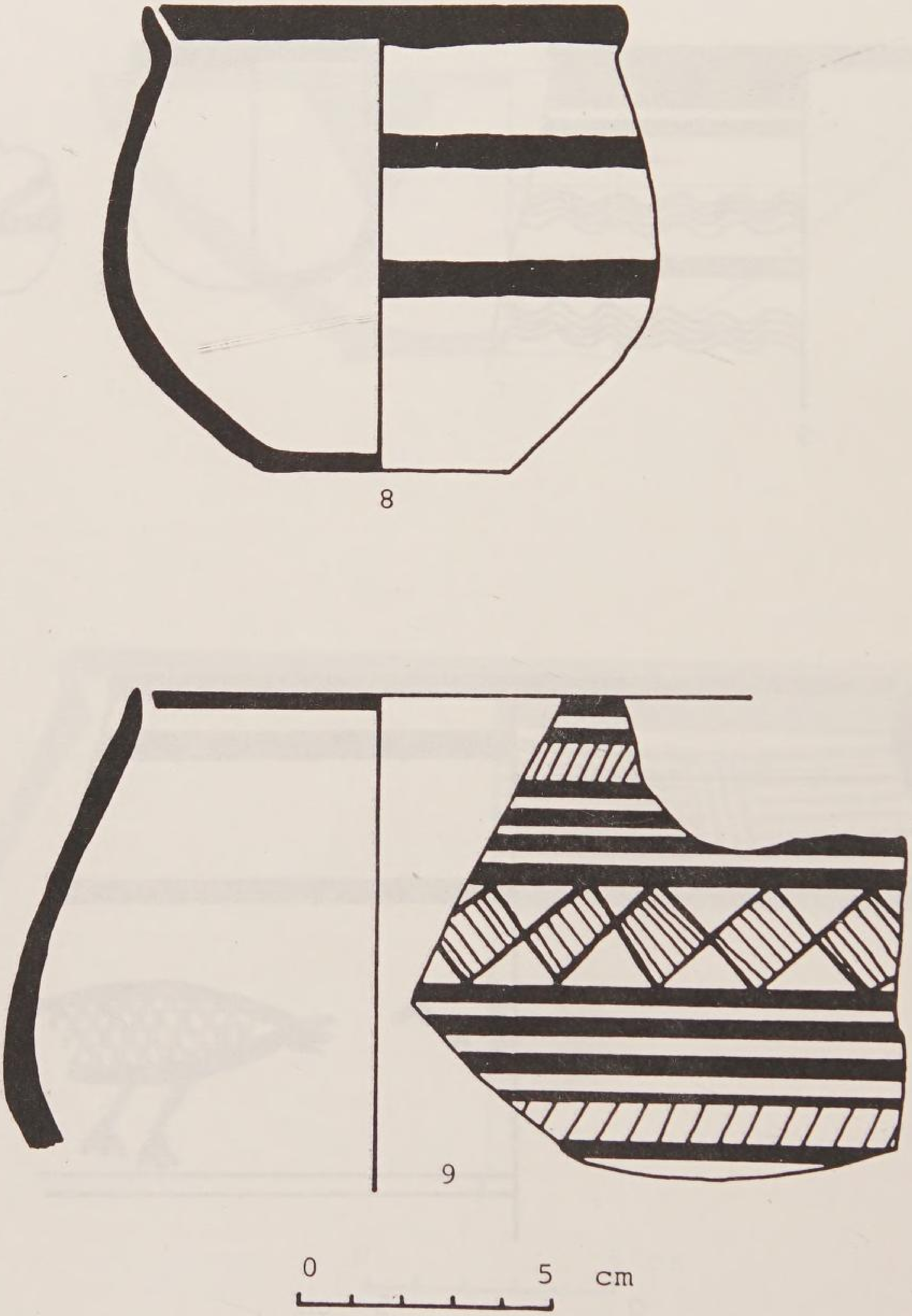


Fig. 39.7. Amri pottery, Ghazi Shah

cultural developments, and an investigation into the contributive factors for the emergence of complex society (civilization) in the lower Indus valley. Ghazi Shah is a rich site and the state of preservation of excavated remains is excellent. Continued research at the site and comparison of results with other geographic areas (e.g., Balochistan and Cholistan) and sites (e.g., Allahdino, Amri, Balakot, Kot Diji, Merhgarh, and Rahman Dheri) will have a bearing on a fuller understanding of prehistoric cultural developments in South Asia.

ACKNOWLEDGEMENTS

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GEORGE F. DALES AND J. MARK KENOYER

40. The Harappa Project 1986-1989: New Investigation at an Ancient Indus City

with Contributions by
K.A.R. KENNEDY, J.R. LUKACS, N. LOVELL, B. HEMPHILL,
R. MEADOW, E. PENDALL, R. AMUNDSON, V. PIGOTT AND C. JENKINS

I. EXCAVATION AND OVERVIEW

INTRODUCTION

HARAPPA has a special place in Indus studies. It was there, a century and a half ago, that Charles Masson made the first references to Harappa and the Indus Civilization (1842: 452). Subsequent random discoveries, mostly of inscribed seals, eventually attracted the attention of the Indian Government but it was not until 1920 that the Archaeological Survey of India officially protected the site and opened a systematic program of excavations, (for reports on the preliminary work see Annual Reports of the ASI for 1920-21, 1923-24, 1924-25 and Sahni 1922). The most extensive excavations were conducted by M.S. Vats between 1926 and 1934-1940. A major event accurred in 1937 when K.N. Shastri discovered Cemetery R. 37 (1965). R.E.M. Wheeler conducted important excavations in the cemetery and on the Citadel Mound AB in 1946 (1947) and Dr. Mhd. Rafique Mughal expanded excavations in the Harappan period cemetery in 1966-1968. (Fig. 40.1).

These investigations provided important clues to the research potentials at Harappa in spite of its one major drawback, namely, during the mid-19th century, the site was severely damaged by railroad contractors who mined bricks for construction of the Lahore-Multan tracks. This disturbance had always posed an obstacle to new excavations but archaeology as a science has advanced dramatically during the past twenty years and new techniques allow more sensitive recovery and recording of the remains than were possible in the earlier years.

Following negotiations in 1984 with the then Director-General of Archaeology, Mhd Ishtiaq Khan, a three-year license was issued for the years 1986-1988. This was renewed for a second three years to 1991 by the current Dirctor-General, Dr. Ahmed Nabi Khan who has been providing generous support and encouragement for this cooperative venture of the University of California at Berkeley and the Pakistan Department of Archaeology.

OVERALL RESEARCH OBJECTIVES

The long-term objectives of the research focus on developing a better understanding of the cultural, economic and social history of Harappa as a discrete urban phenomenon and also its role in the development and life of the Indus Civilization as a whole.

In the context of the mid-third millennium B.C., a site of this size was not born fully formed, but must have grown out of a smaller, pre-urban settlement. Wheeler's excavations in 1946 had, in fact, turned up Early Harappan (Kot Diji related) sherds beneath massive structures along the western edge of the Citadel Mound E (Wheeler 1947). A major objective of the Harappa project has been to locate

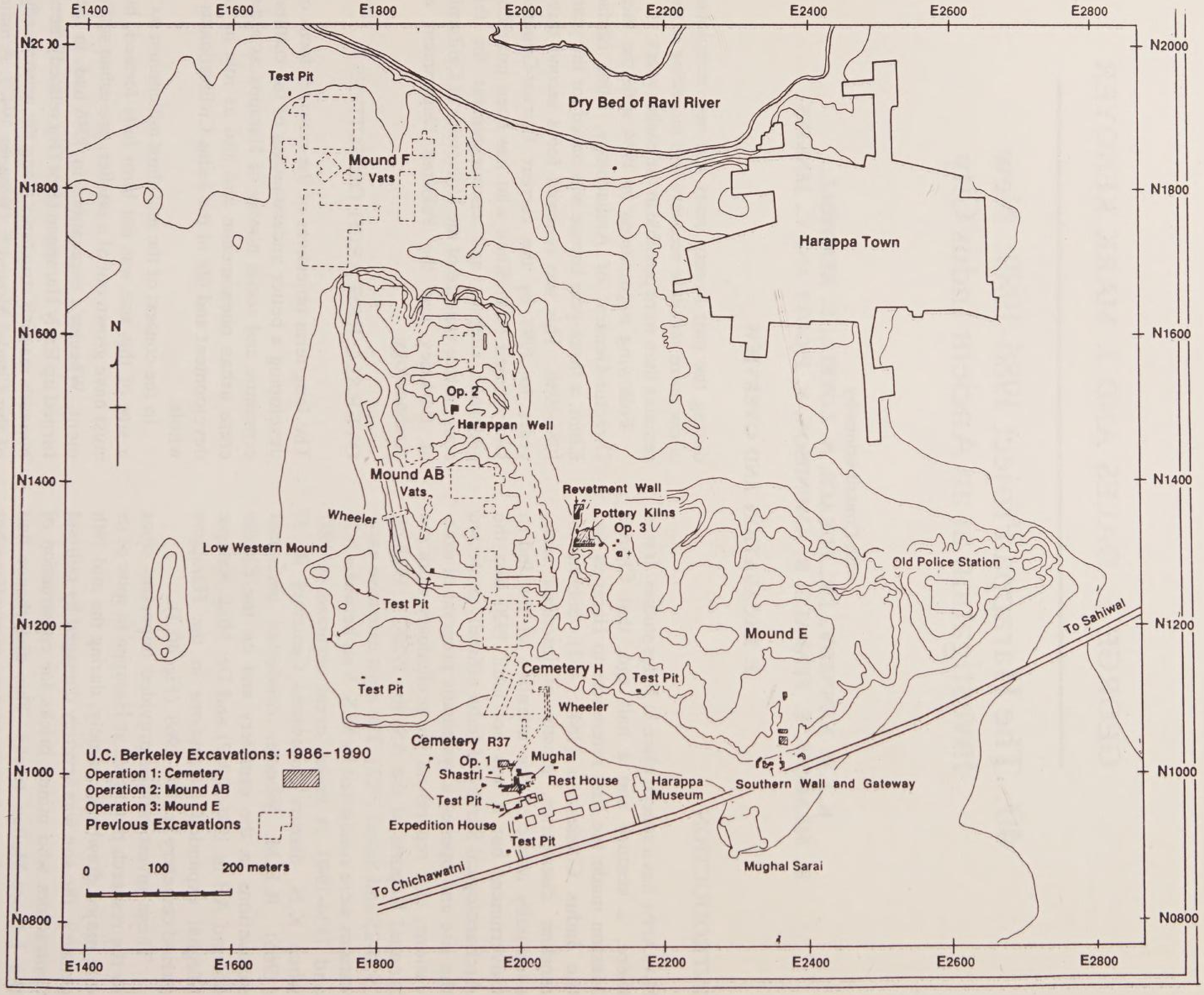
E1400
E1600
E1800
E2000
E2200
E2400
E2600
E2800
N2000
N1800
N1600
N1400
N1200
N1000
N0800
N
Test Pit
Dry Bed of Ravi River
Mound F
Vats
Harappa Town
Op. 2
Harappan Well
Mound AB
Vats
Wheeler
Low Western Mound
Test Pit
Revetment Wall
Pottery Kilns
Op. 3
Old Police Station
Mound E
To Sahiwal
Cemetery H
Test Pit
Test Pit
Wheeler
Cemetery R37
Op. 1
Shastri
Mughal
Rest House
Harappa Museum
Southern Wall and Gateway
Test Pit
Expedition House
Test Pit
Mughal Sarai
To Chichawatni
U.C. Berkeley Excavations: 1986-1990
Operation 1: Cemetery
Operation 2: Mound AB
Operation 3: Mound E
Previous Excavations
0
100
200 meters

Fig. 40.1. Site plan of Harappa showing areas of excavations.

the Early settlement and to investigate as many factors as possible relating to the chronological, cultural and technological relationships between the Early and Mature Indus settlements.

The current research at Harappa includes the reconstruction of the prehistoric environment and the ecological setting through the study of the soils and sediments—both natural and anthropogenic—within and surrounding the site as well as through the study of the palaeobotanical and faunal remains.

Very little was published by the earlier excavators relating to the daily life of the Harappans, their subsistence patterns, settlement patterns, or socio-economic structures. The new project is addressing these types of issues with methodologies and scientific procedures not available to the earlier excavators.

Another aspect of Harappan life that is of special interest is ritual activity. At no site of the Indus culture has a temple or ritual structure been irrefutably identified. On the other hand, the largest sites such as Harappa and Mohenjodaro have yielded scores of figurines and other artifacts that suggest some sort of ritual or symbolic practices. Through the correlation of stylistic features and spatial distributions of figurines and other symbolic objects it may be possible to identify general aspects of cultic and religious practices that may or may not have been associated with specific architectural structures.

In addition to the habitation areas of the site, we have focused excavations on the Harappan cemetery dating to the Urban Phase. The new excavations have provided a wide range of information on Harappan burial practices as well as the physical characteristics of the urban population, new information regarding sex and age, disease, trauma, stress, diet, and causes of death.

Another interest relates to the enigmatic Indus script. After 70 years of decipherment efforts we are still unable to understand this ancient script, the language it represents, and its functions within Harappan society. Continuing excavations at the site may turn up longer texts or a bilingual inscription that would provide new insights into these questions.

Essential to the pursuit of the above goals is the establishment of a secure internal relative chronological framework, enhanced with "absolute" dates derived from radiocarbon analysis. No comprehensive internal chronology exists for Harappa, nor is its precise relative position within the Indus Civilization certain.

Many of the specific studies of artifacts, technology and site formation processes etc. are being supplemented with problem-oriented experimental and ethnographic research. The present town of Harappa and the surrounding settlements provide a unique opportunity to study the organization of occupational specialists, especially craftsmen, and how this organization is reflected in the archaeological record. We are also conducting experimental reconstructions of ancient technologies using locally available raw materials. The types of manufacturing waste and the finished artifacts themselves provide important comparative materials for more reliable interpretations of the archaeological data.

This report presents an overview of the current state of research at Harappa, with summaries of the major findings from the first four seasons (1986-89) and an addendum with a brief description of important discoveries and developments during the January-March 1990 season.

DEFINITION OF TERMS AND THE CULTURAL SEQUENCE

Over the past fifty years, different labels have been used for the stages of cultural development in the greater Indus Valley, such as pre-Harappan, Early Harappan, Early Indus, Mature Harappan, Late Harappan, Post Harappan, and Cemetery H. All have the common feature of implying a uniform linear development. Often the same label has been applied to what may in fact be regional variations, thereby resulting in a confusing overlap of what should be distinguishing cultural features.

In our own preliminary reports we have used some of these terms in a very general and undefined manner to communicate the general association of artifacts and structural units with one or the other cultural phase. However, from the rapidly accumulating new evidence at Harappa, it is clear that there are significant temporal and regional variations that have become obscured by the continued use of these terms. It is proving helpful to use more objective terms to distinguish the cultural, technological and socio-economic sequences of events at Harappa. In this and subsequent reports we will use the designations of Period I, II, III, IV and V. These Periods have no innate reality but have considerable heuristic value for ordering the masses of new material and for focusing analyses on specific questions of continuity and/or discontinuity. They are described here in general terms and will be related to the more commonly used terms with necessary qualifications.

Period I

The earliest levels of the site contain ceramics related to Kot Dijian ceramics from Kot Diji (Khan 1965; Mughal 1970), Jalilpur II (Mughal 1974), Rehman Dheri I, II and III (Durrani 1989), Sarai Khola (Halim 1970-71, 1972), and sites in the Bannu region (Khan, Knox, and Thomas 1988). These ceramics are associated with what Dr. Mughal defined as the Early Harappan, or formative phase of the Indus Civilization (Mughal 1970) and with Possehl's (1977) Pre-urban Harappan (Fig. 40.2).

Period II

Period II levels are characterized by the construction of massive mud brick revetments or retaining walls at the periphery of the mound as revealed so far at the northwestern corner of Mound E. In certain areas there is evidence for the construction of massive platforms or foundations inside the peripheral walls. These structures are associated with numerous strata containing ceramics identical to those in Period I. However, in the later levels of Period II there are some stylistic and morphological changes in the ceramics that may reflect a continuous development or a synthesis of different cultural elements leading up to the ceramic styles of the Mature Harappan. (Figs. 40.3 and 40.4).

Period III

Period III comprises those cultural, stylistic and technological features that are commonly associated with the "mature" urban Indus period as known from other sites throughout the greater Indus Valley. It is distinguished at Harappa, at the northwestern edge of Mound E, by the construction of massive retaining walls of baked brick, directly above the earlier mud brick structures of Period II. On the upper slope there is evidence for massive mud brick platforms that consolidate the edge of the mound and provide foundations for other structures. On the top of Mound E, Period III is represented by streets and drains together with mud brick and baked brick structures oriented in the cardinal directions.

The associated pottery is related to that of the Mature Indus Civilization that has been documented at Harappa (Vats 1940) and Mohenjodaro (Marshall 1931, Mackay 1943, Dales and Kenoyer 1986). Also there are distinctive seals, tokens, chert weights, metal objects, figurines, terracotta artifacts of many types, and the so-far undeciphered Indus script.

Period IV

The Period IV designation refers to stratigraphic deposits on Mound E and possibly on Mound AB containing ceramics which are not readily identified as either Mature Harappan or Late Harappan/Cemetery H. They appear to represent a transitional development between these two otherwise distinctive cultural occupations. On the basis of ceramic styles and morphology, some of the latest burials in our cemetery excavations, as well as some of the early burials in the Cemetery H excavation by Vats (1940), may be associated with Period IV.

The precise distinction and characterization of this period will be possible only after more extensive exposures of the pertinent levels are made and the ceramics and other artifacts have been fully studies.

Period V

The final occupation of the protohistoric period is characterized by Cemetery H or Late Harappan ceramics as first defined by Vats (1940) and later by Wheeler (1947). Most of the strata with these ceramics have been obliterated by brick robbing, but there are isolated units on Mound E where undisturbed levels have been identified.

Mound E

Most of the Period V occupation deposits had been obliterated by brick robbing and erosion, however in one small area a mud brick platform and drain was found associated with Period V pottery. The drain was made from baked bricks that were smaller than the earlier Period III bricks, however, the proportions are still the same (1:2:4). In addition to the distinctive pottery, there are other categories of artifacts such as faience objects and some distinctive figurines associated with the pottery that may also be related to this period.

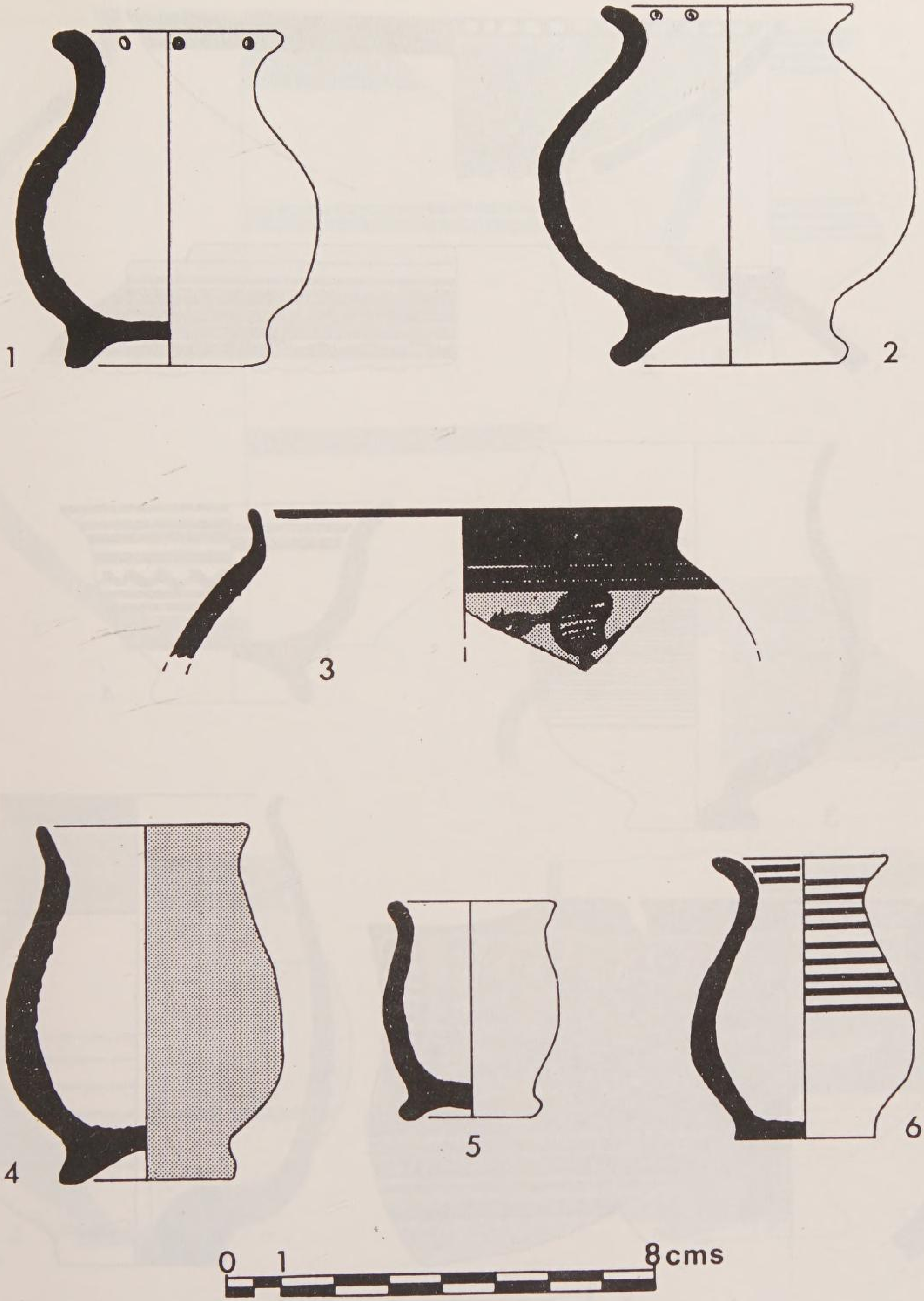
1
2
3
4
5
6
0
1
8cms

Fig. 40.2. Pottery: from Early (Period I).

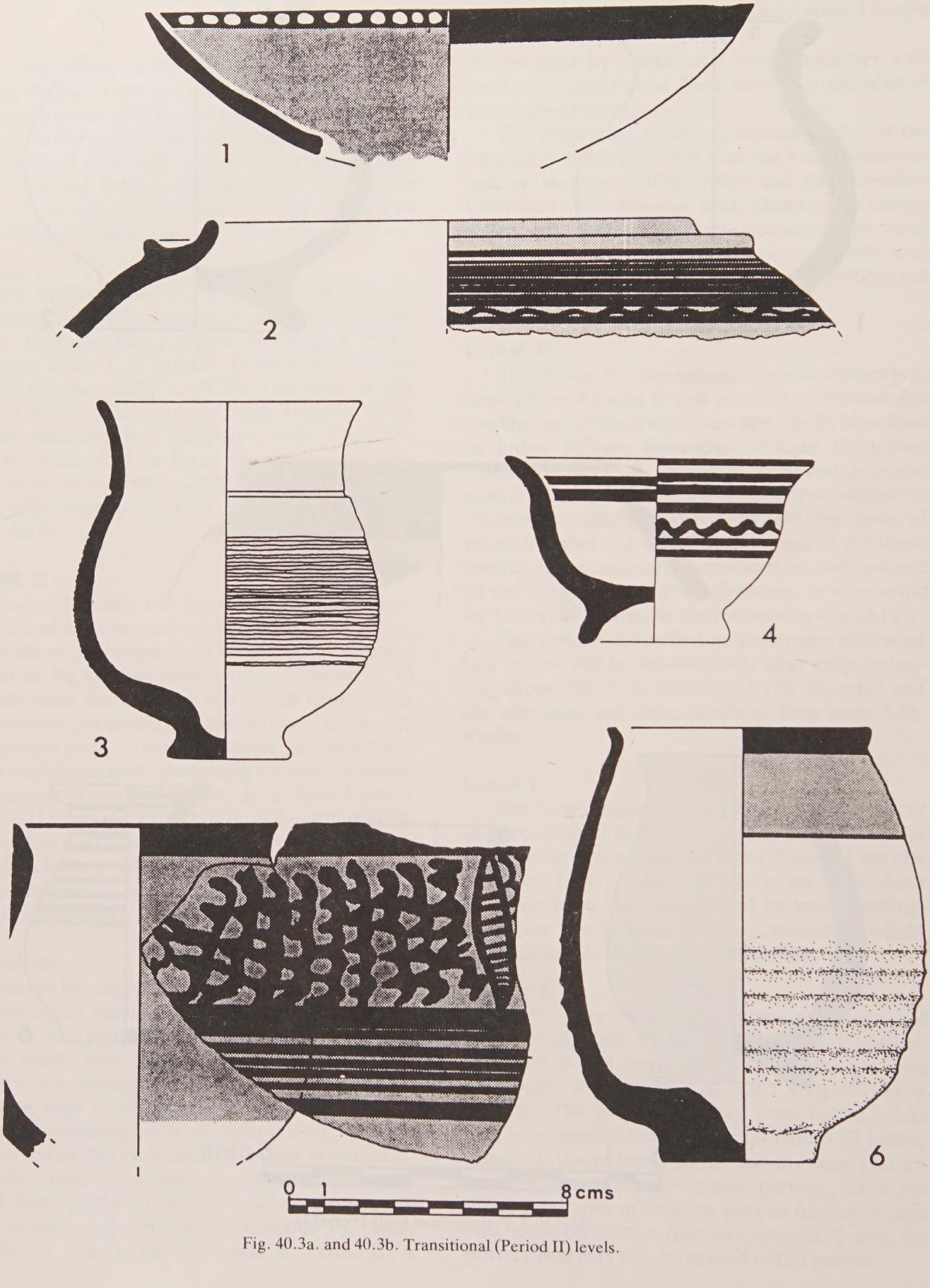
1
2
3
4
6
0 1 8cms

Fig. 40.3a. and 40.3b. Transitional (Period II) levels.

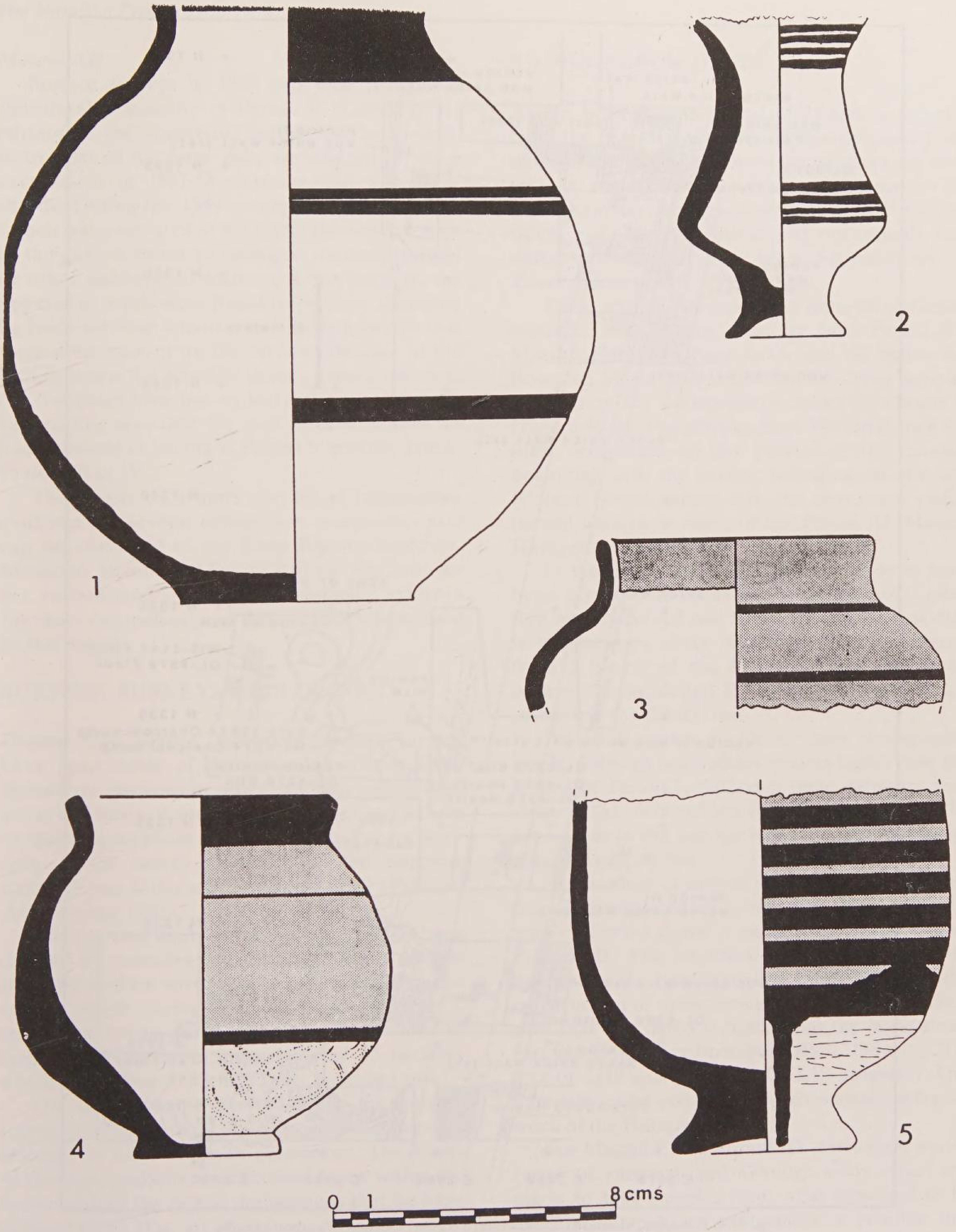
1
2
3
4
5
0 1 8cms

Fig. 40.3b.

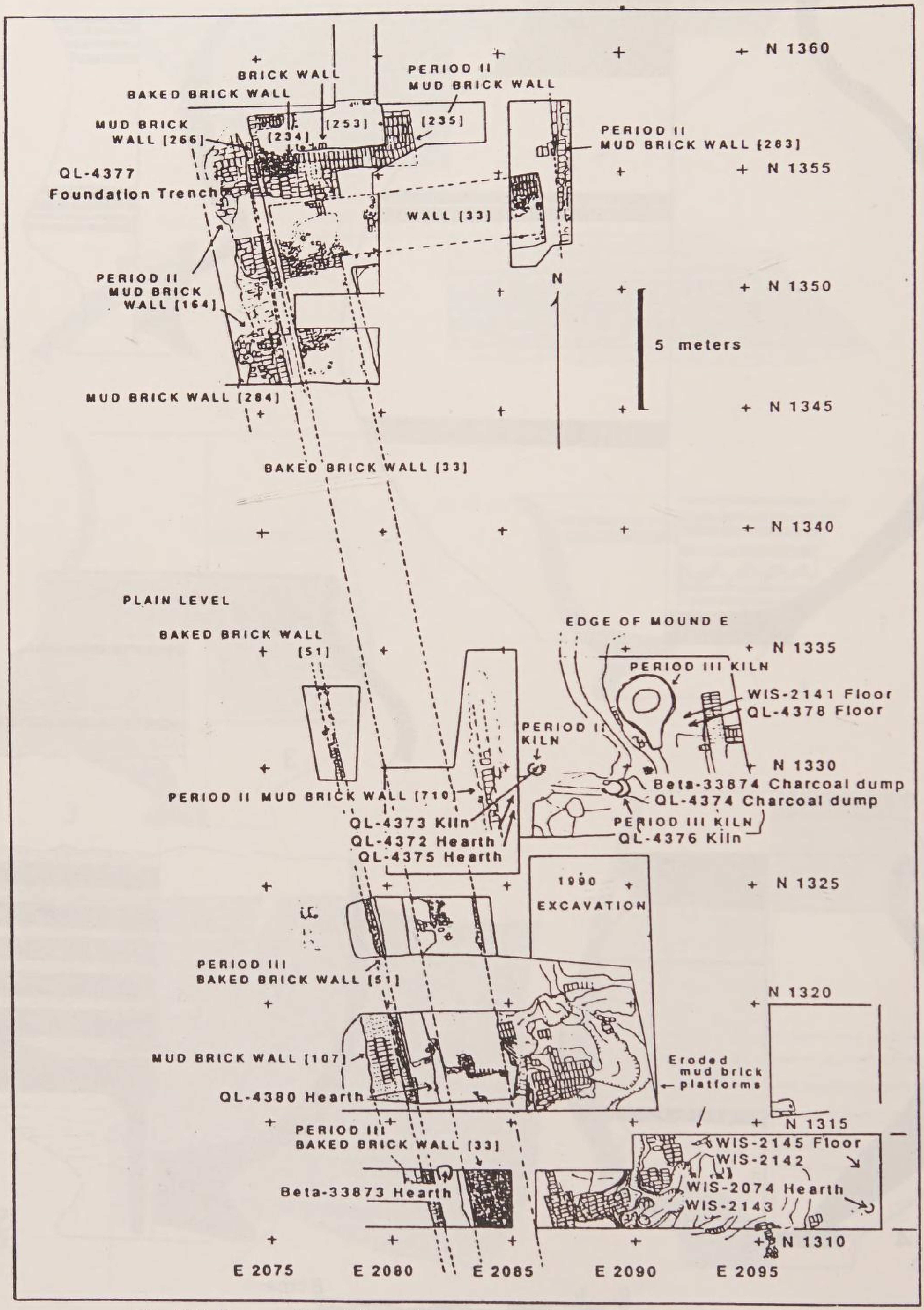
N 1360
BRICK WALL
BAKED BRICK WALL
PERIOD II MUD BRICK WALL
MUD BRICK WALL [266]
[234]
[253]
[235]
PERIOD II MUD BRICK WALL [283]
QL-4377 Foundation Trench
N 1355
WALL [33]
PERIOD II MUD BRICK WALL [164]
N
N 1350
5 meters
MUD BRICK WALL [284]
N 1345
BAKED BRICK WALL [33]
N 1340
PLAIN LEVEL
BAKED BRICK WALL [51]
EDGE OF MOUND E
N 1335
PERIOD III KILN
WIS-2141 Floor
QL-4378 Floor
PERIOD II KILN
N 1330
Beta-33874 Charcoal dump
QL-4374 Charcoal dump
PERIOD II MUD BRICK WALL [710]
QL-4373 Kiln
QL-4372 Hearth
QL-4375 Hearth
PERIOD III KILN
QL-4376 Kiln
1990 EXCAVATION
N 1325
PERIOD III BAKED BRICK WALL [51]
N 1320
MUD BRICK WALL [107]
QL-4380 Hearth
Eroded mud brick platforms
N 1315
PERIOD III BAKED BRICK WALL [33]
WIS-2145 Floor
WIS-2142
Beta-33873 Hearth
WIS-2074 Hearth
WIS-2143
N 1310
E 2075
E 2080
E 2085
E 2090
E 2095

Fig. 40.4. Harappa, Mound E, northwestern corner; location of carbon sample.

Mound AB

Surface surveys in 1987 and 1988 revealed a considerable quantity of Period V (Cemetery H) pottery in the uppermost surface of the Mound. Both sides of the large gully we selected for deep excavations in 1987-88 were covered with these sherds. During the 1989 season a long north-south trench was excavated at the top of the western edge of the gully in hopes of finding *in situ* architectural or other habitational features. Unfortunately, the uppermost levels were found to be badly disturbed by brick robbing activities and modern burials that were not apparent on the surface. Because of the burials it was not possible to fully expose the area, but it appears from the vertical sections on the gully side of this area that the mud brick structures we had expected to belong to Period V actually date to Period III or IV.

The earlier excavators also found fragmentary evidence for several subsequent occupations that can be attributed to the Early Historic/Buddhist, Medieval, Islamic and British Periods. We have not yet encountered significant stratigraphic evidence for these occupations and they will not be discussed in this report.

SURFACE SURVEYS AND TEST PITS

During each season, systematic surface surveys have been made of the mounded area and the immediate environs in order to locate undisturbed areas and areas of specialized activities and to help in selecting locations for excavations. For a discussion of the survey methodology and sampling strategies see Dales and Kenoyer (1989) (Pakistan Archaeology 1990).

The physical limits of the site have not yet been defined by extensive excavations, but it is evident from the surface surveys, test pits, and systematic corings made during 1987-1988, that the site is much larger than previously supposed, possibly as large as 150 hectares instead of the 45 hectares which Vats refers to for the higher mounded area.

On the evidence derived from the surface surveys and subsequent test pits, several areas were selected for more extensive excavations. The results of these excavations are discussed below within the framework of the period designations that we have defined above (Fig. 40.1).

RADIOCARBON DATES

At the present time a total of 21 carbon samples from the recent excavations at Harappa have been dated (Table 40.1). Additional samples from the excavations are still being processed. Twenty of the dated samples were processed using the conventional radiocarbon method and one sample was dated with Accelerator Mass Spectrometer in Zurich (Beta-33873, ETH-5949).

These various samples come from two different mounds. Four of the dates are from Period III, Mature Harappan floor levels and fill below the floors on Mound AB, while the remaining samples come from the northwestern corner of Mound E (Figure 40.5). The samples from Mound E span the total occupation of this portion of the mound, beginning with the earliest hearth on natural soil (Period I) and ending with the uppermost undisturbed habitation levels of the Period III, Mature Harappan occupation.

In the table and graphs given, the dates have been arranged in their relative stratigraphic position on Mound AB and Mound E. The earliest date is obtained by using AMS technique and comes from a hearth of the Period I, Early Harappan occupation on Mound E. This hearth was situated just above the natural soil.

Period II, dates are from upper stratigraphic levels, between one and two meters higher than the hearth of Period I, Although these dates are very close to the dates of the following Period III, the dates from *in situ* hearths indicate a slightly earlier range (Figure 40.3a).

One sample of carbon (QL-4377) was obtained from a foundation trench between a large mudbrick wall of Period 2 and a smaller mudbrick wall of Period III. The objective of this sample was to determine the latest possible time frame for the construction of these structures. The piece of charcoal that was dated indicates that the latest structure could not have been built after 2198 B.C., 2151 B.C. or 2149 B.C. (based on CALIB program). This date falls quite well within the chronological framework of the Harappan Phase.

For Mound E, the Period III, dates show a wide range of variation and although every effort was made to take samples from what appeared to be undisturbed primary contexts, it is possible that

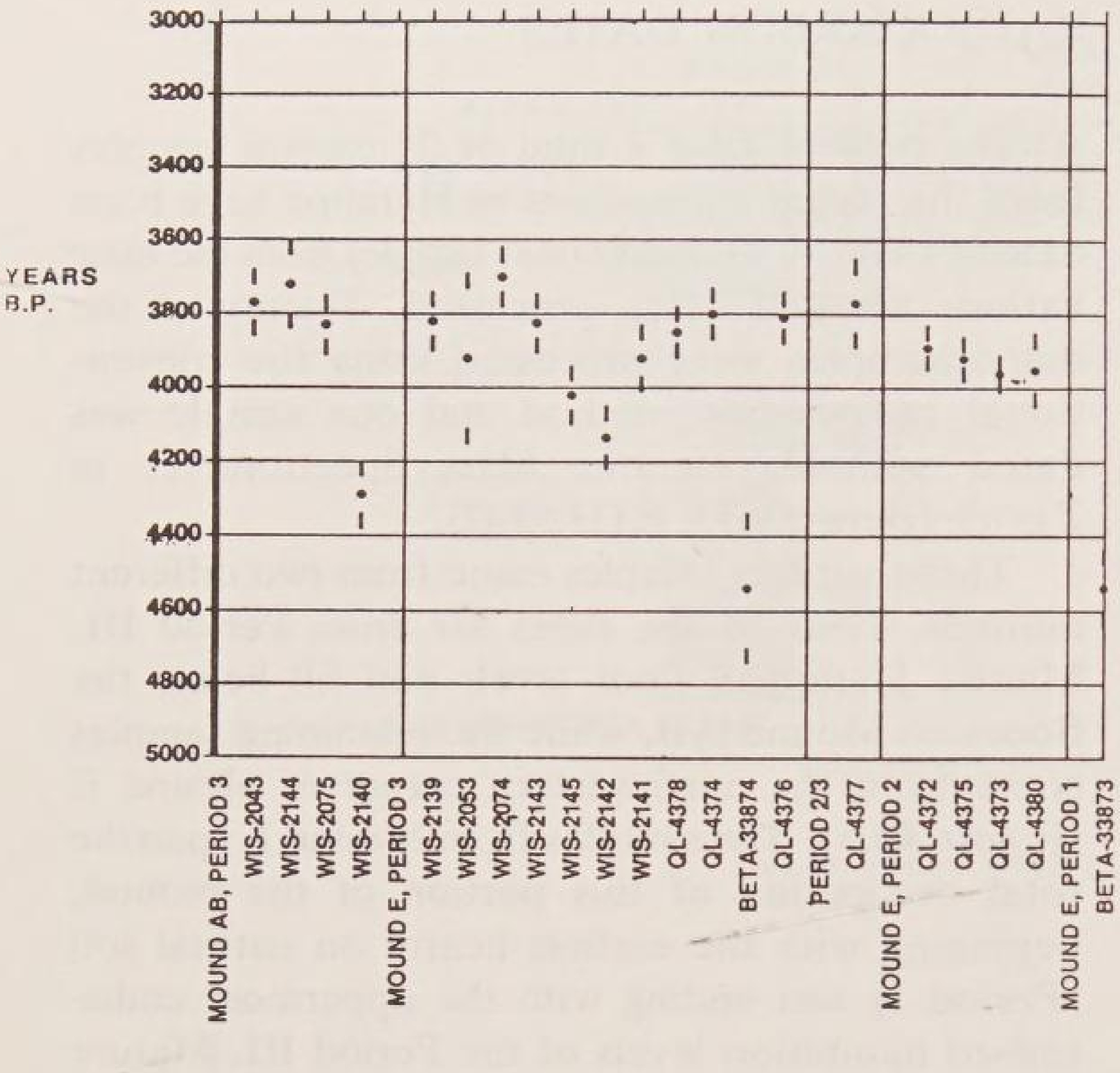

Fig. 40.5a. Harappa dates: 5568 B.P. Arranged stratigraphically.

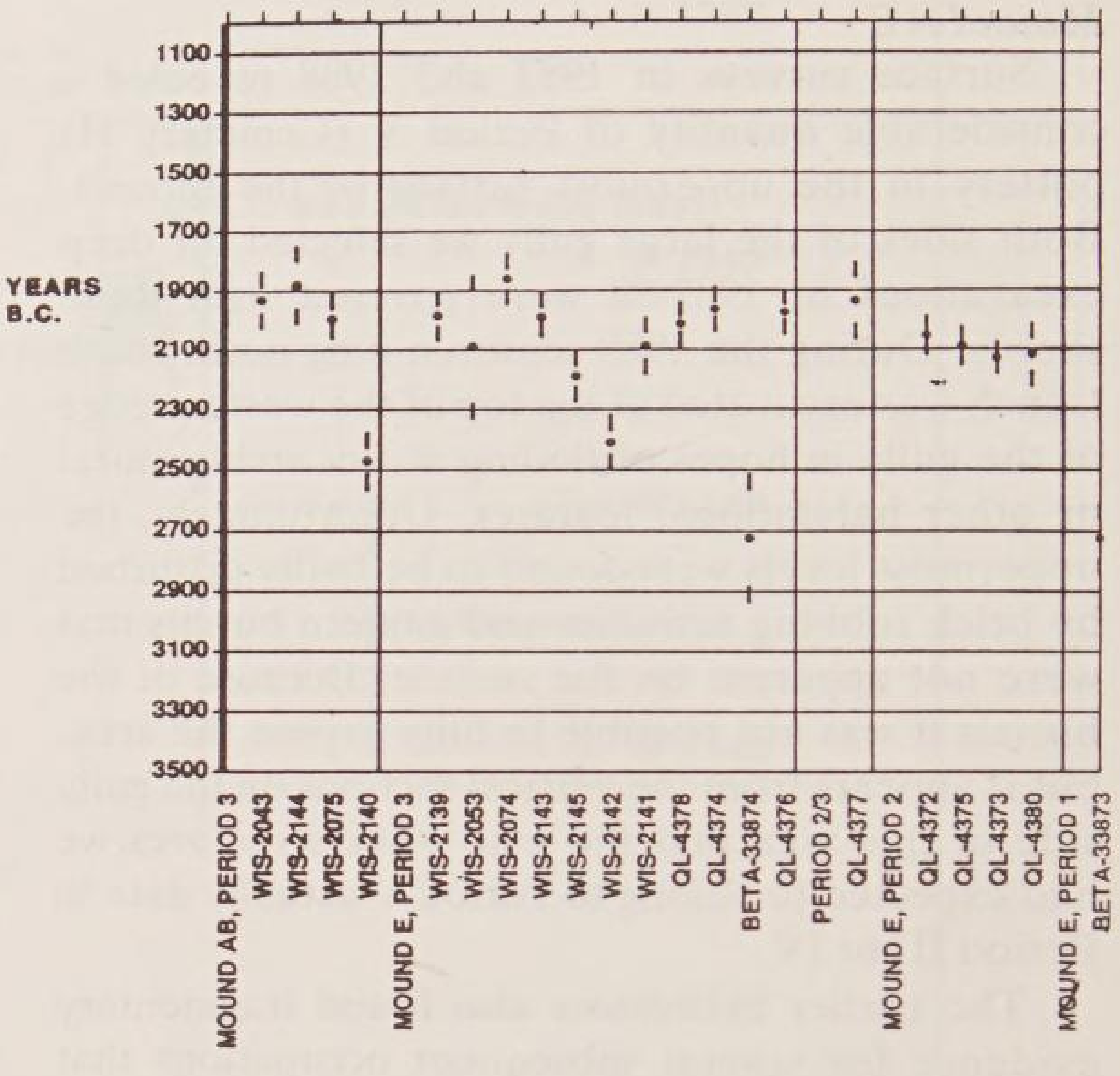

Fig. 40.5b. Harappa dates: 5730 B.C. Arranged stratigraphically.

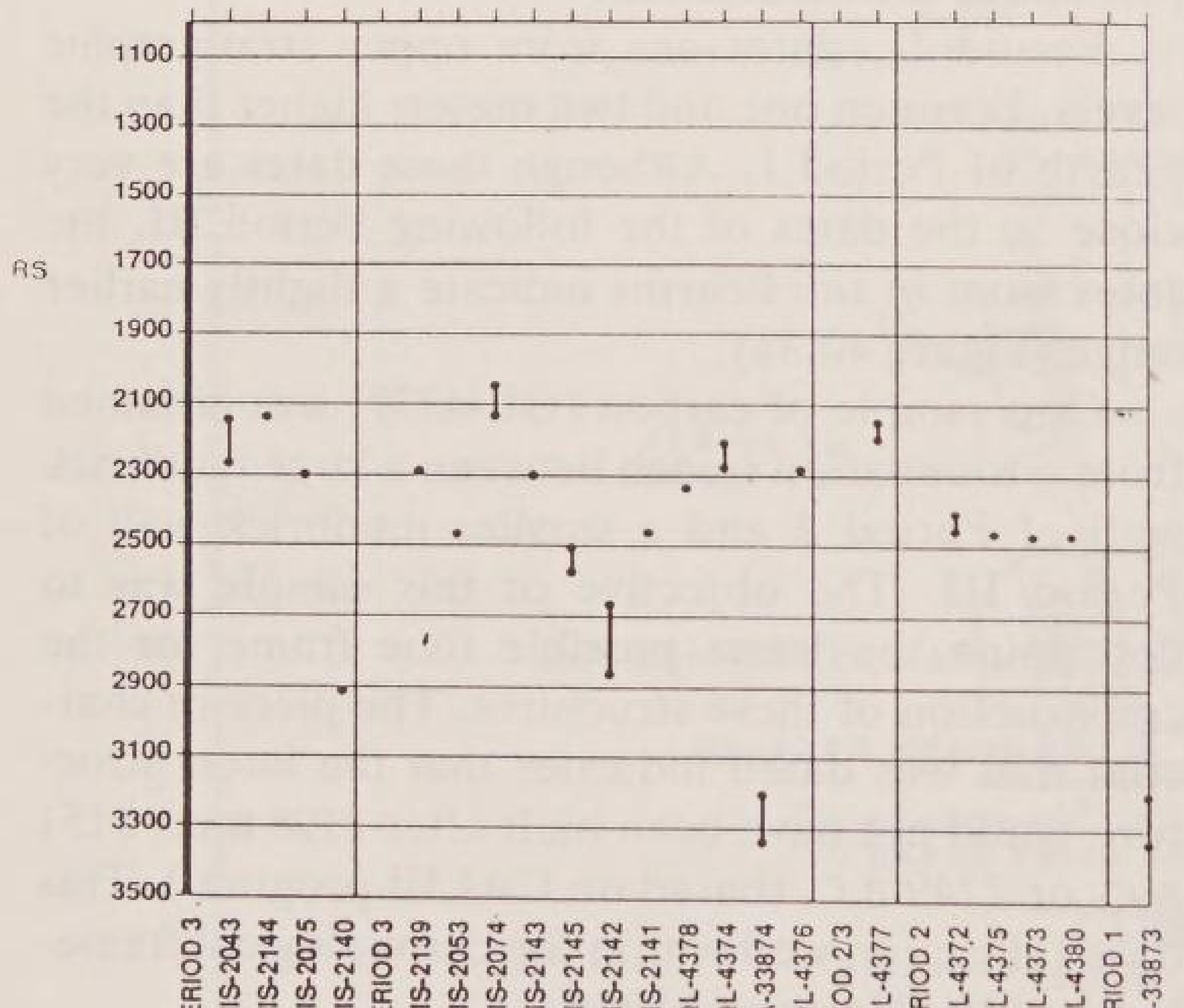

Fig. 40.5c. Harappa dates: Calibrated arranged stratigraphically.

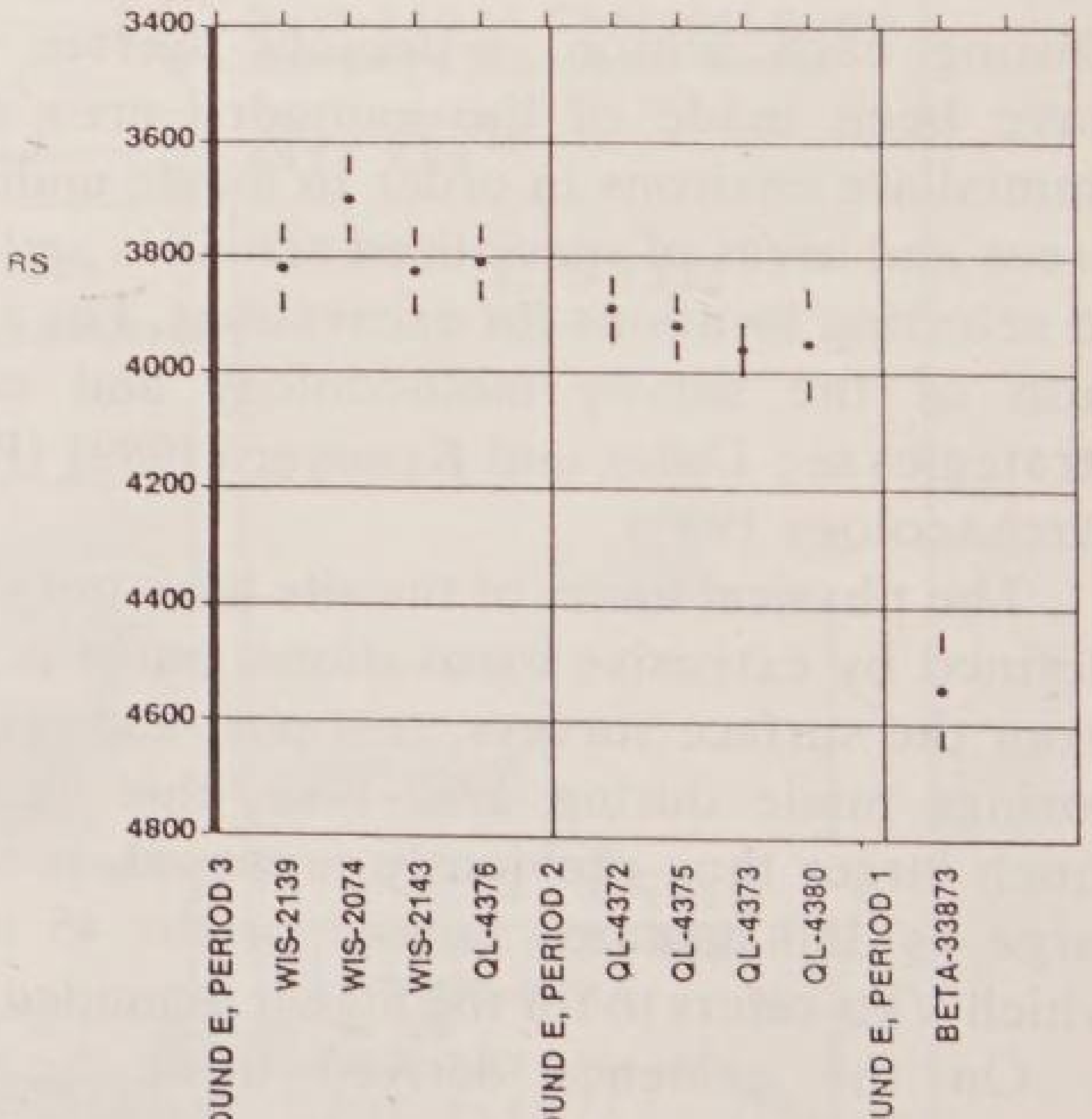

Fig. 40.6a. Harappa dates: 5568 B.P. Charcoal from inside hearths and kilns arranged stratigraphically.

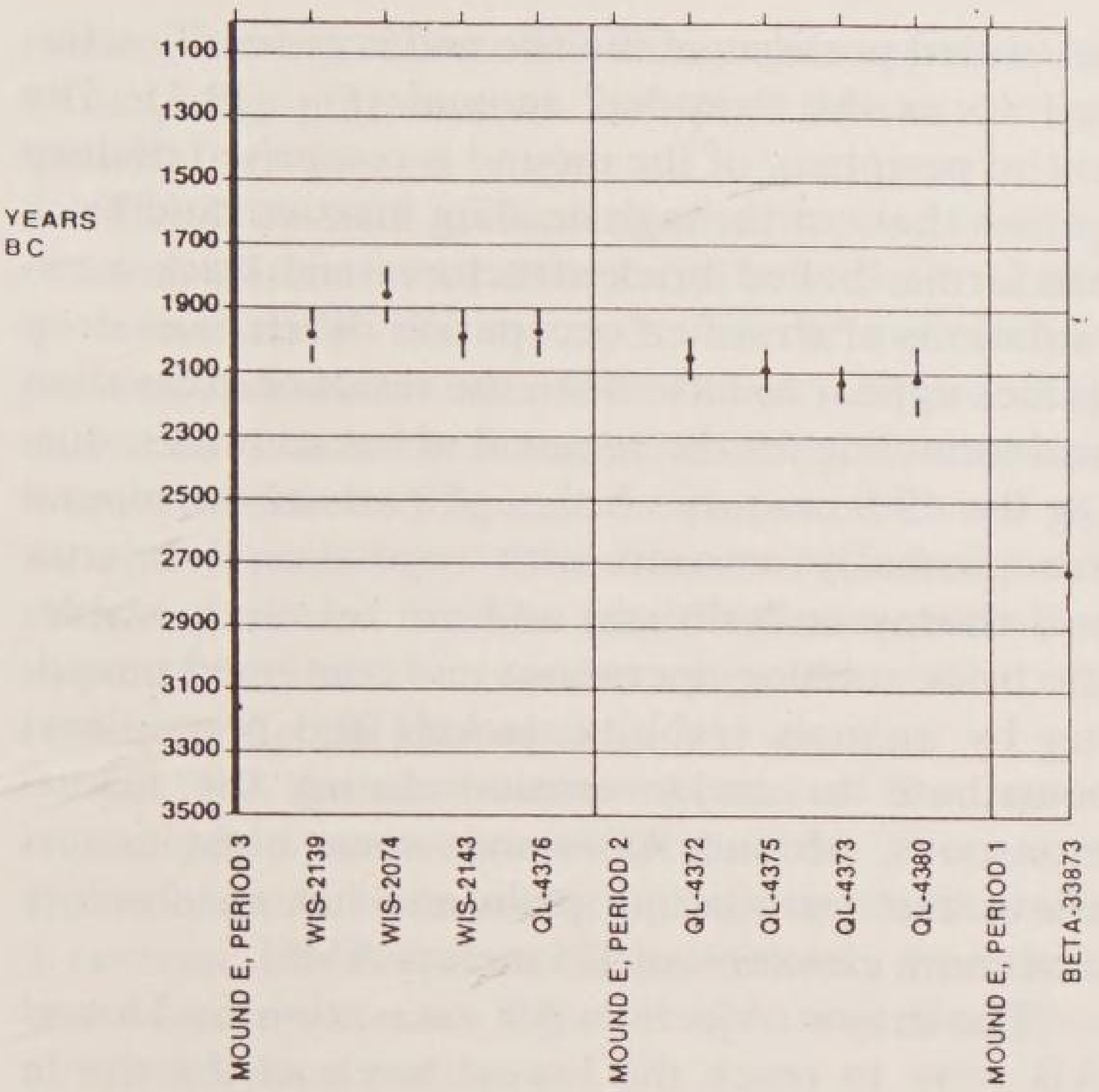

Fig. 40.6b. Harappa dates: calibrated charcoal from inside hearths and kilns arranged stratigraphically.

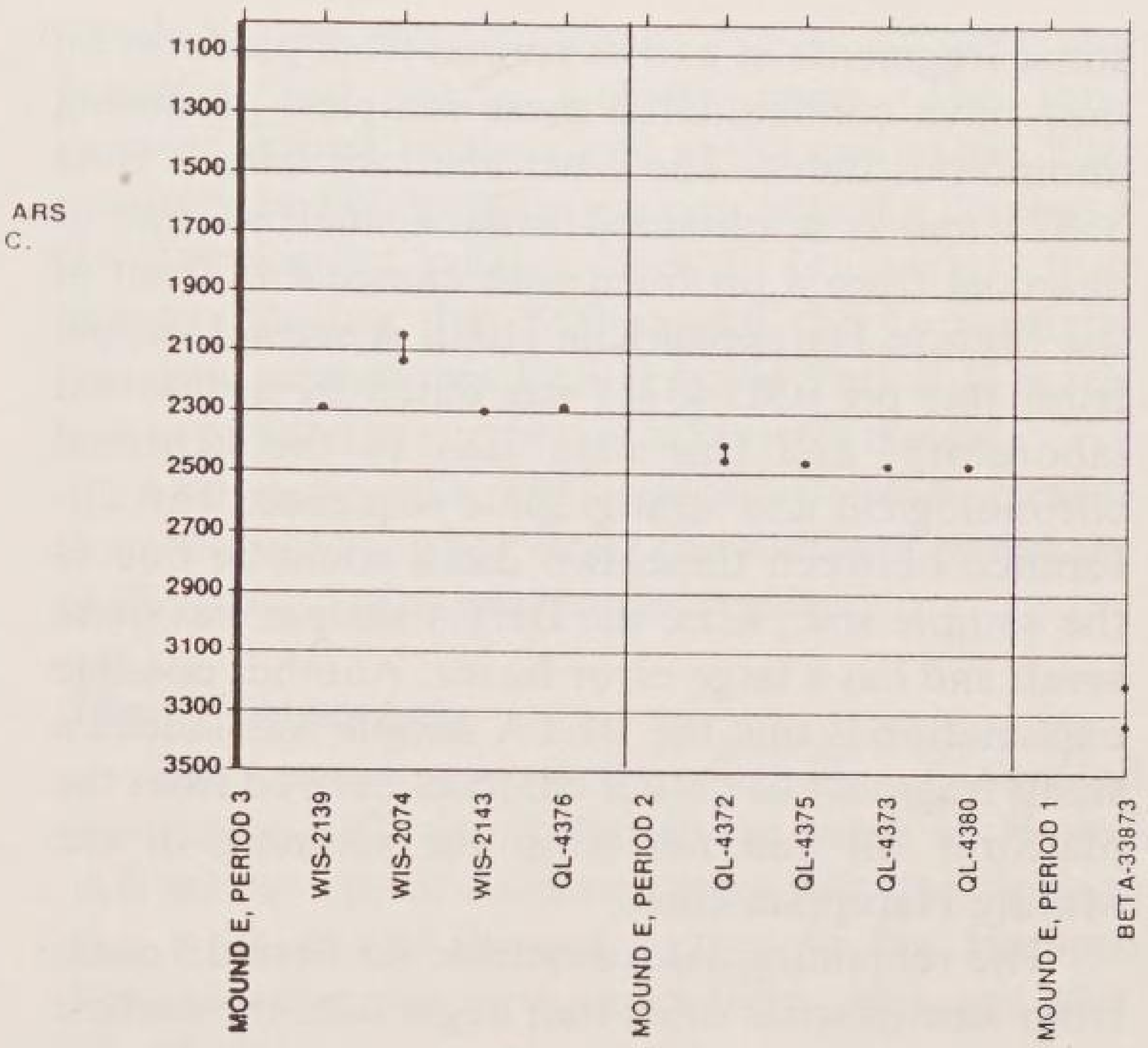

Fig. 40.6c. Harappa dates: calibrated charcoal from inside hearths and kilns arranged stratigraphically.

Table 40.1. Harappa dates arranged stratigraphically*

PROVENIENCE	5568 bp		5730 bc		CALIB bc
MOUND AB, PERIOD 3					
WIS-2043	3770	± 70	1930	± 70	2268, 2263, 2203, 2147, 2146
WIS-2144	3720	± 100	1880	± 105	2138
WIS-2075	3830	± 60	1995	± 60	2299
WIS-2140	4290	± 70	2470	± 70	2913
Mound E PERIOD 3					
WIS-2139**	3820	± 60	1985	± 60	2288
WIS-2053	3920	± 210	2090	± 215	2469
WIS-2074**	3700	± 60	1861	± 60	2133, 2067, 2047
WIS-2143**	3825	± 60	1990	± 60	2293
WIS-2145	4020	± 60	2190	± 60	2573, 2535, 2506
WIS-2142	4135	± 65	2410	± 65	2863, 2812, 2742, 2726, 2696, 2677, 2666
WIS-2141	3920	± 70	2090	± 70	2462
QL-4378	3850	± 50	2015	± 50	2334
QL-4374	3800	± 50	1965	± 50	2278, 2234, 2209
BETA-33874	4540	± 180	2725	± 185	3338, 3213, 3203
QL-4376*	3810	± 50	1975	± 50	2283
MOUND E	**PERIOD 2/3**				
QL-4377	3770	± 100	1935	± 105	2198, 2151, 2149
MOUND E PERIOD 2					
QL-4372**	3890	± 40	2055	± 40	2455, 2416, 2405
QL-4375**	3920	± 40	2090	± 40	2462
QL-4373**	3960	± 30	2130	± 30	2470
QL-4380**	3950	± 80	2120	± 80	2468
MOUND E PERIOD 1					
BETA-33873**	4530	± 85	2725	± 90	3338, 3213, 3203

* The dates Arranged According to the Specific Stratigraphy in each Area of the site. Mound AB dated can only correlated with Mound E dates on the basis of General Ceramic Comparisons, but they are approximately Equal to the period 3 dates from Mound E.

** These dates are from Charcoal Inside Hearths Or Kilns.

(Acknowledgement: Radiocarbon dates From the Radiocarbon Lab of the Center for Climatic Research, University of Wisconsin-Madison, were supported by the Climate Dynamics Program, National Science Foundation under grant ATM86-03295.)

some fragments of earlier carbon from platform fill may have contaminated these samples, producing anomolous dates. The most aberrant date is Beta 33874 and it is obtained from a small sample of charcoal from a pit filled with charcoal in front of the Mature Harappan Kiln [100]. A second sample from this pit (QL 4374) was dated by a different laboratory, and this date falls in the expected chronological and stratigraphic sequence. The difference between these two dates could be due to the sample size, since the BETA sample was quite small and has a large error factor. Another possible explanation is that the BETA sample was indeed a small fragment of earlier charcoal derived from the platform fill and not from the cleaning of the Mature Harappan kilns.

The remaining dates available for Period 3 come from stratigraphic units that begin with the earliest deposits containing Mature Harappan ceramics and continue to the latest undisturbed levels of the Mature Harappan phase. On both Mound AB and Mound E, there are between one and two meters of disturbed Mature Harappan occupation levels above the uppermost dated levels (WIS-2139 and WIS-2043). Consequently the latest dates can not be taken to represent the end of Period 3.

For Period III, (Mature Harappan) the dated samples range from 2913 B.C. to 2047 B.C. (based on CALIB program). Since 2900 B.C. is much earlier than dates reported at any other Harappan site, it is possible that the earliest dates (WIS-2140 and WIS-2142) are based on charcoal from the proceeding phase that has been mixed in with the fill on the floors of the Mature Harappan occupation.

By using only the dated from undisturbed hearths and kilns, which come from the middle of the stratigraphic sequence, the mid-range for Period 3 falls between 2293 B.C. and 2047 B.C. (based on CALIB program). It should be pointed out that even when he samples of carbon are taken from the same hearth (WIS-2074 and WIS-2143), there is possibility of a wide range in the counted date. However, given the ± 60 years for a one-sigma standard deviation, the two sigma deviation would be 120 years. For all practical purposes, these dates are identical.

EXCAVATIONS: General Descriptions of Areas

Mound AB

Mound AB dominates the western half of the mounded portions of the site and is generally referred to as the "citadel" mound (Fig. 40.1). The entire periphery of the mound is comprised of deep gullies that cut through eroding massive mud brick platforms, baked brick structures and thick accumulations of stratified occupation debris. The deep gullies appear to have been the result of excavation and tunneling for the removal of baked bricks, during the 19th century. Although parts of the mound are presently covered with vegetation (tamarisk and thorny underbrush) and are relatively stable, the brick robbing operations and continued tunneling by animals (rabbits, jackals and porcupines) contribute to major erosion during the annual monsoons. Mound AB stands some eight meters above the surrounding plain and has an absolute maximum elevation of 175 meters AMSL.

The major objectives for excavation on Mound AB were to reach the lowest levels of the site in order to document the structural history of the mound and to locate the Early Harappan (Period I) settlement. The first location selected for excavations was in the southwestern corner, just south of Wheeler's main trench, where an erosional gully provided easy access to the lower levels of the site. In 1986 a test pit beginning with an area of three by five meters was excavated down to natural soil. With the exception of a single stratum, just beneath the eroded surface of the gully, with in situ features of Period III, the deposits were all debris and secondary in nature. Several small sherds of Early pottery were found in the lowest debris layer.

A second excavation area is in the east-central portion of the mound. Here again, a deep gully provided access to undisturbed occupation layers in the center of the ancient mound and also the possibility of reaching the earliest occupation levels. In 1987 and 1988, excavations were conducted along the slopes and in the lower portion of this gully (Fig. 40.1, Pl. 40.17), and in 1989 the uppermost levels of the gully slopes were investigated in hopes of locating undisturbed contexts of Period V (Cemetery H).

Mound E

Mound E is the large mound that dominates the southeastern quarter of the site. (Fig. 40.1). The maximum height of the mound, at the northwest corner, is 172.8 meters AMSL, slightly lower than Mound AB. The central and eastern parts of the mound are heavily eroded along what appear to be either major streets or collapsed brick robbing tunnels.

The 1986-1987 surface surveys revealed that the eroding perimeter of the mound provides a wealth of information. For example, on the easternmost portion known as the Old Police Station, craft activities such as shell working and chert processing were identified. The southern perimeter of the mound revealed numerous traces of baked brick architecture and massive mud brick structures that appeared to be the remains of platforms (but see Notes on the 1991 Season).

In 1987 the northwestern corner of the mound was selected for excavation (Fig. 40.5). There were traces of massive mud brick platforms, brick walls, a ceramic production area, and pottery from both the Mature (Period III) and the late Harappan (Period V) occupations.

The initial excavations in 1987 were limited to test pits on the top of the mound to determine the degree of disturbance by brick robbers and to identify the cultural association of rectangular features observed on the surface. Rectangular shaped surface features are found scattered across the entire length of Mound E and they are oriented in many different directions. Some of these resemble eroded mud brick walls but excavations in 1987 revealed that at least one group of these features consists of shallow rectangular pits probably dug by brick robbers. The dirt and brick bats from the pits were piled along the edges giving the impression of walls.

Additional excavations in this area in 1988 confirmed that the uppermost layers of architecture had been robbed of bricks, and an East India Company two anna coin dated to 1843, Victoria Queen, provides dated evidence for the brick robbing activities. Fortunately, beneath the disturbed layer, Period III (Mature Harappan) architectural units are preserved in association with streets, drains and sump pits.

In 1988, more extensive excavations were begun on the northwestern slope of Mound E. These consisted of a five-meter wide step trench oriented east-west and extending from the crest to the base of the mound (Figs. 40.5, 40.6 and 40.7). Horizontal exposures were made in five by five meter areas. In 1989, additional areas were exposed to the north and south of the step trench to expose architectural features and special activity areas. The total excavated area on the slope at the end of the 1989 season was 181.5 square meters, with the depths of the excavations ranging from 50 centimeters to 6 meters. During the 1990 season the horizontally exposure uppermost Period I and Period II levels was expanded to an area of 225 square meters.

Also during the 1990 season extensive excavations were conducted along the southern periphery of the mound with unexpected results.

The Cemetery Area

The cemetery area—originally designated Cemetery R37—is located to the south of Mound AB and is known to extend from irrigated fields to the west of the mounded area to the Harappa Museum grounds in the east (Figs. 40.1 and 40.8, Pl. 40.1).

The modern topography of the cemetery area before excavations was an undulating surface comprised debris derived from the ancient mound. After 1946 much of the area was leveled and cleared of underbrush and several buildings were constructed over portions of the cemetery. Beginning in 1986, we excavated test pits to determine the extent of the cemetery, and in the course of subsequent seasons, 25 one by two meter pits were dug. Where there was evidence for burials, or concentrations of bones or pottery, the pits were expanded and the areas were excavated horizontally.

SUMMARY OF FINDINGS

Period I

Wheeler had reported early sherds from the lowest levels of his large trench on the western edge of the citadel mound (AB), but our discovery of similar sherds on the tops of his other dumps indicates that the early settlement might have extended virtually the entire north-south length of the Period III "citadel."

Our 1986 test pit within the southwestern corner of Mound AB confirmed the presence of early sherds in secondary deposits just above natural soil. The slope and direction of waterborne sediments in the lowest levels from east to west suggested that the earliest settlement itself was further east under Mound AB or even further under Mound E.

And, in fact, our excavations of the northwestern corner of Mound E have revealed the presence of the Period I (Early Harappan) mound. And during the 1990 season, more Early deposits were found along the southern slope of Mound E. Associated with the walls and occupational levels are distmetive early pottery (Figs. 40.9, 40.10, 40.11) and figurines (Figs. 40.13 to 40.17).

Period II

Period II is defined primarily by the construction of massive walls discovered along the northwestern periphery of Mound E (Fig. 40.5). The walls are made with large mudbricks that measure 10 × 20 × 40 centimeters. The orientation of these mud brick walls is approximately 10° west of true north. They, as well as the later baked brick walls of Period III have approximately the same orientation as the so called "defense walls" identified by Wheeler on Mound AB (12° west of magnetic North). It is possible that Wheeler's earliest walls actually belong to this period.

Five, possibly six, superimposed walls are made of the large mud bricks. The most complete wall [164] extends north-south for over 15 meters (Fig. 40.5). It is two meters wide and has a surviving height of approximately two meters. A possible northwestern corner of this wall has been identified but its eastern extension has been obliterated by later construction.

Wall [235] was built after wall [164]. It is 2.5 meters wide and has a well defined corner and eastern extension that continues for about four meters. The north-south portion of this wall has been obliterated by later Period III (Mature Harappan) construction.

The precise function of the walls is not clear, but since the exterior faces are invariably eroded and the interior faces are not eroded, they may have functioned as retaining or revetment walls.

Due to the disturbance by Period III structures, the precise stratigraphic relationship between the perimeter walls and the large section of early deposits exposed at the edge of Mound E is still not clear. In the section (Figs. 40.6 and 40.7) we can see that the Period I and II deposits make up a mound that is 2.5 to 3 meters high at its exposed western edge.

Specific types of artifacts found in the Period I deposits were found also in Period II. In addition, numerous stone beads, a stone celt, distinctive human and animal figurines, triangular terracotta cakes, terracotta toy tops, and red fired terracotta bangles were found. These categories of artifacts, along with certain ceramic types, continue into Period III (Mature Harappan). The detailed study of these artifacts will help clarify some of the questions about change and continuity between the Early and Mature Harappan periods.

One very important discovery in Period II is a small round kiln, 50 × 60 cm in diameter and approximately 40 cm high containing early pottery (Pl. 40.14). This kiln has a unique firing structure made by placing the upper half of a large pot in the center of the kiln. The fuel appears to have been placed on the outside of the broken pot as well as on the inside. The interior of the pot is vitrified and reduced while the exterior is oxidized. This suggests that the objects being fired may have been placed inside the pot for a high temperature reduction that would have resulted in dark gray or black color. Possibly this structure was for firing the thin grayish-black bangles that are common in Periods I and II, but no bangles were found inside the kiln. The presence of this technology in the Early Harappan levels at Harappa may have some relationship to the development of the stoneware bangle production of Period III that has been documented recently at Mohenjodaro by Halim and Vidale (1984).

Period III

New evidence relating to the transition from Period II to Period III has been documented so far only on Mound E. This transition is defined on the basis of architecture and changes in artifact types. Although there is an architectural continuity in terms of orientation and brick bonding, a major development is seen in the introduction of baked brick combined with mud brick, construction in Period III.

Many artifacts and ceramic forms demonstrate significant continuities between Periods I-II and III but the overall stylistic features of ceramics, figurines, stone tools, ornaments, etc. during Period III are distinctive.

Period III: Peripheral Walls and Platforms (Fig. 40.5)

At the northwest corner of Mound E the massive mud brick perimeter walls of Period II appear

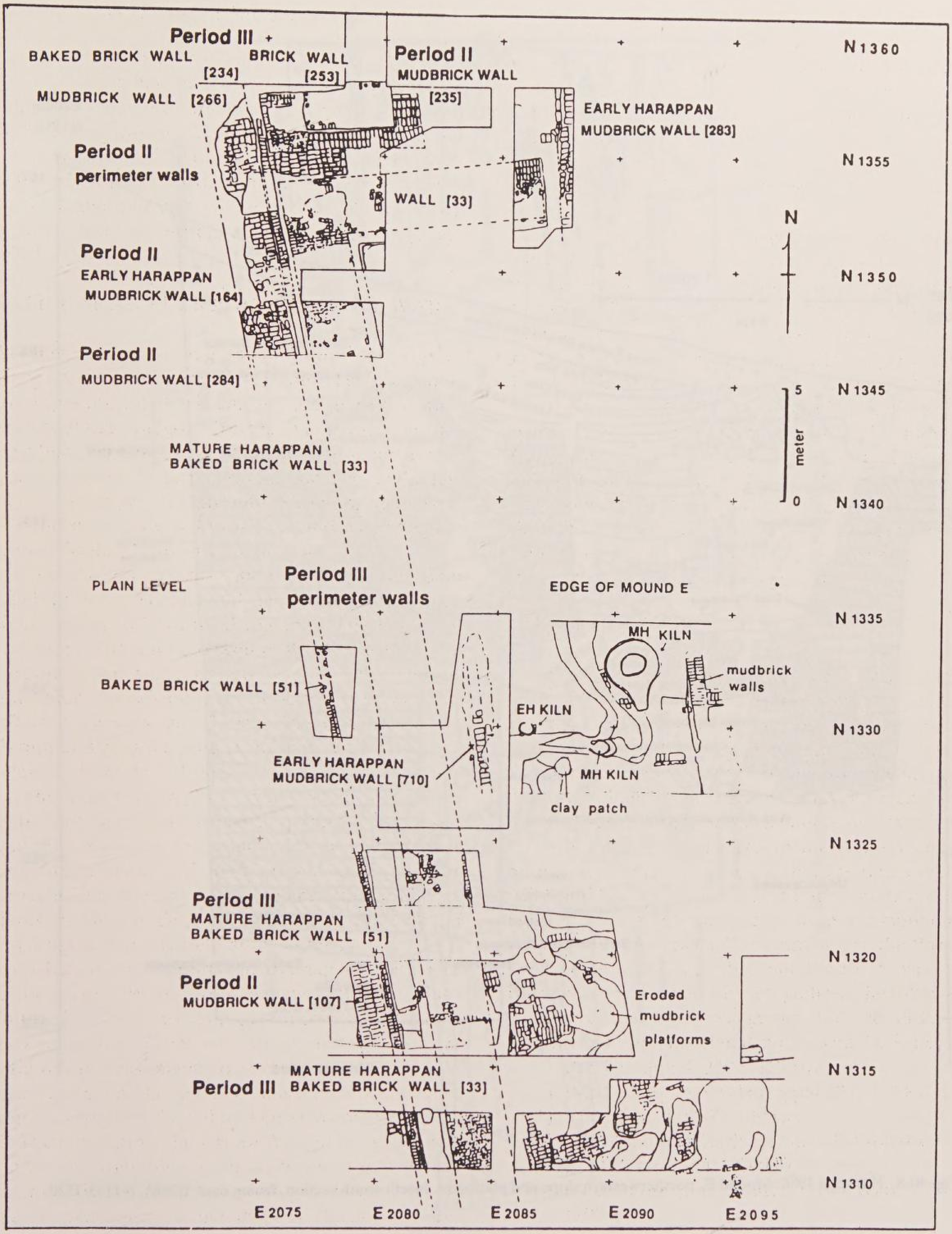
Period III
BAKED BRICK WALL [234]
BRICK WALL [253]
Period II
MUDBRICK WALL [235]
MUDBRICK WALL [266]
EARLY HARAPPAN
MUDBRICK WALL [283]
Period II
perimeter walls
WALL [33]
Period II
EARLY HARAPPAN
MUDBRICK WALL [164]
Period II
MUDBRICK WALL [284]
MATURE HARAPPAN
BAKED BRICK WALL [33]
N
5
meter
0
N1360
N1355
N1350
N1345
N1340
PLAIN LEVEL
Period III
perimeter walls
EDGE OF MOUND E
N 1335
MH KILN
mudbrick
walls
BAKED BRICK WALL [51]
EH KILN
N 1330
EARLY HARAPPAN
MUDBRICK WALL [710]
MH KILN
clay patch
N 1325
Period III
MATURE HARAPPAN
BAKED BRICK WALL [51]
N 1320
Period II
MUDBRICK WALL [107]
Eroded
mudbrick
platforms
MATURE HARAPPAN
Period III
BAKED BRICK WALL [33]
N 1315
N 1310
E 2075
E 2080
E 2085
E 2090
E 2095

Fig. 40.7. Harappa 1989: Mound E, northwestern corner.

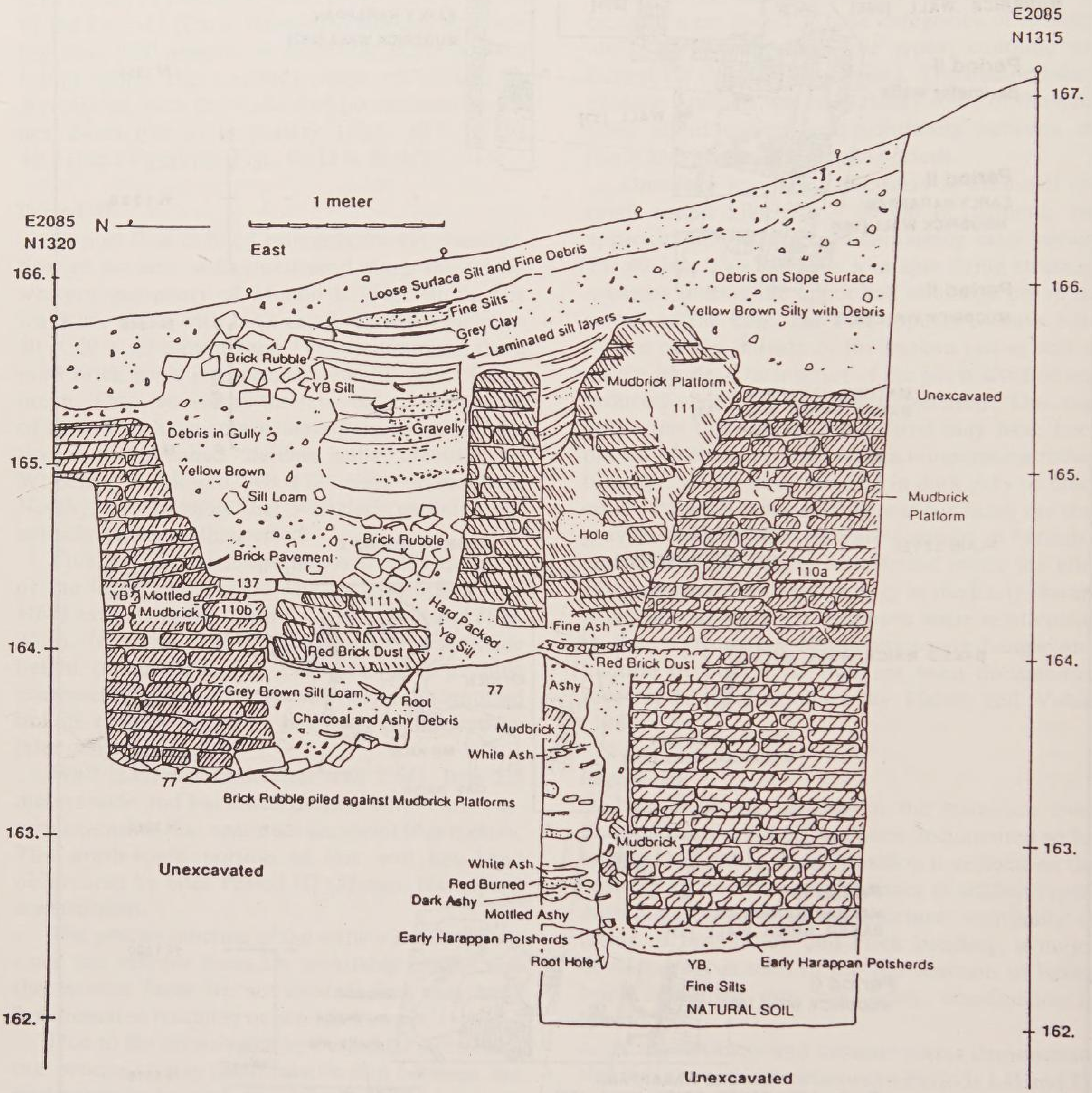
E2085
N1315
167.
1 meter
E2085
N1320
N
East
166.
Loose Surface Silt and Fine Debris
Debris on Slope Surface
166.
Fine Silts
Grey Clay
Yellow Brown Silty with Debris
Laminated silt layers
Brick Rubble
YB Silt
Mudbrick Platform
111
Unexcavated
Debris in Gully
Gravelly
165.
Yellow Brown
Silt Loam
165.
Mudbrick
Platform
Hole
Brick Rubble
Brick Pavement
110a
137
YB Mottled
Mudbrick
110b
111
Hard Packed
YB Silt
Fine Ash
164.
Red Brick Dust
Red Brick Dust
164.
Ashy
Grey Brown Silt Loam
Root
77
Charcoal and Ashy Debris
Mudbrick
White Ash
77
Brick Rubble piled against Mudbrick Platforms
163.
Mudbrick
163.
Unexcavated
White Ash
Red Burned
Dark Ashy
Mottled Ashy
Early Harappan Potsherds
Root Hole
YB.
Early Harappan Potsherds
Fine Silts
NATURAL SOIL
162.
162.
Unexcavated

Fig. 40.8. Harappa 1988: Mound E, northerwestern slope and platforms. North-south section, facing east: E2085, N1315-1320.

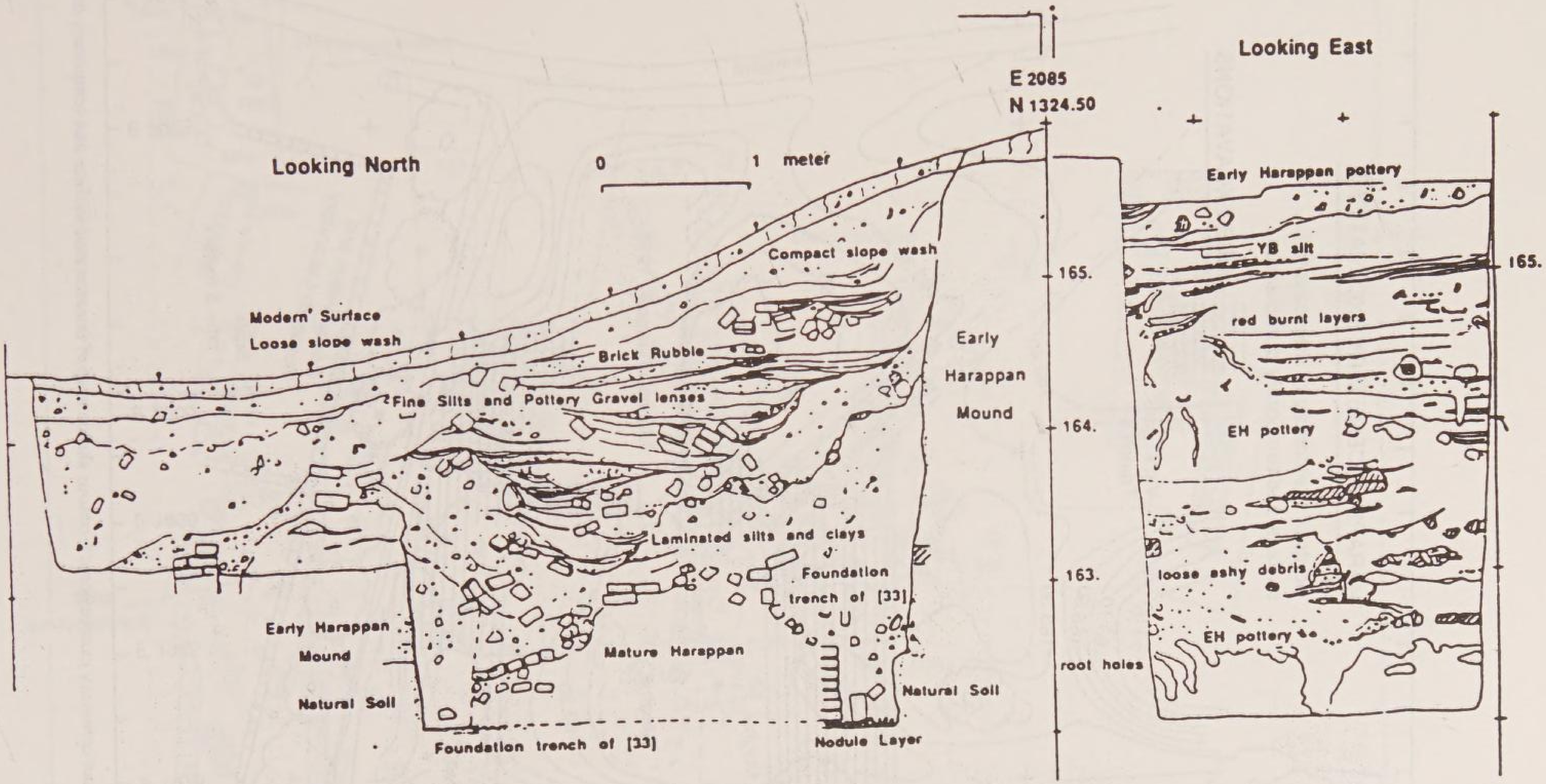
Looking North
0
1 meter
E 2085
N 1324.50
Looking East
Early Harappan pottery
YB silt
165.
red burnt layers
EH pottery
loose ashy debris
EH pottery
root holes
165.
164.
163.
Early
Harappan
Mound
Compact slope wash
Modern' Surface
Loose slope wash
Brick Rubble
Fine Silts and Pottery Gravel lenses
Laminated silts and clays
Foundation
trench of [33]
Early Harappan
Mound
Mature Harappan
Natural Soil
Natural Soil
Foundation trench of [33]
Nodule Layer

Fig. 40.9. Harappa 1989: Mound E, slope section of Early Harappan Mound.

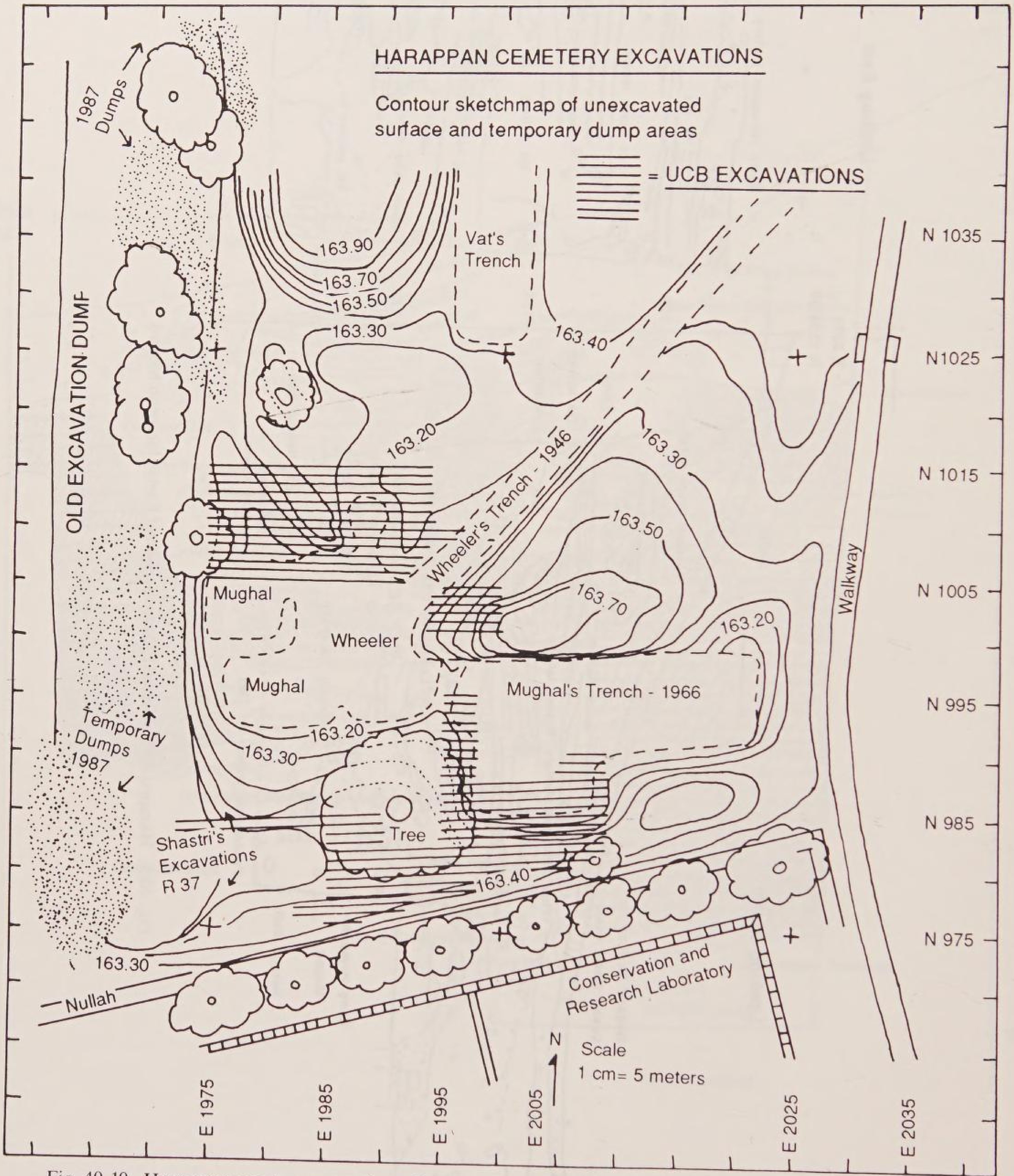
HARAPPAN CEMETERY EXCAVATIONS
Contour sketchmap of unexcavated surface and temporary dump areas
= UCB EXCAVATIONS
1987 Dumps
OLD EXCAVATION DUMP
163.90
163.70
163.50
163.30
163.20
Vat's Trench
163.40
Wheeler's Trench - 1946
163.30
163.50
163.70
163.20
Mughal
Wheeler
Mughal
Mughal's Trench - 1966
Temporary Dumps 1987
163.20
163.30
Tree
Shastri's Excavations R 37
163.40
163.30
Nullah
Conservation and Research Laboratory
Walkway
N
Scale
1 cm= 5 meters
N 1035
N1025
N 1015
N 1005
N 995
N 985
N 975
E 1975
E 1985
E 1995
E 2005
E 2025
E 2035

Fig. 40.10. Harappan cemetery excavations: Contour sketch map of unexcavated surface and temporary dump areas.

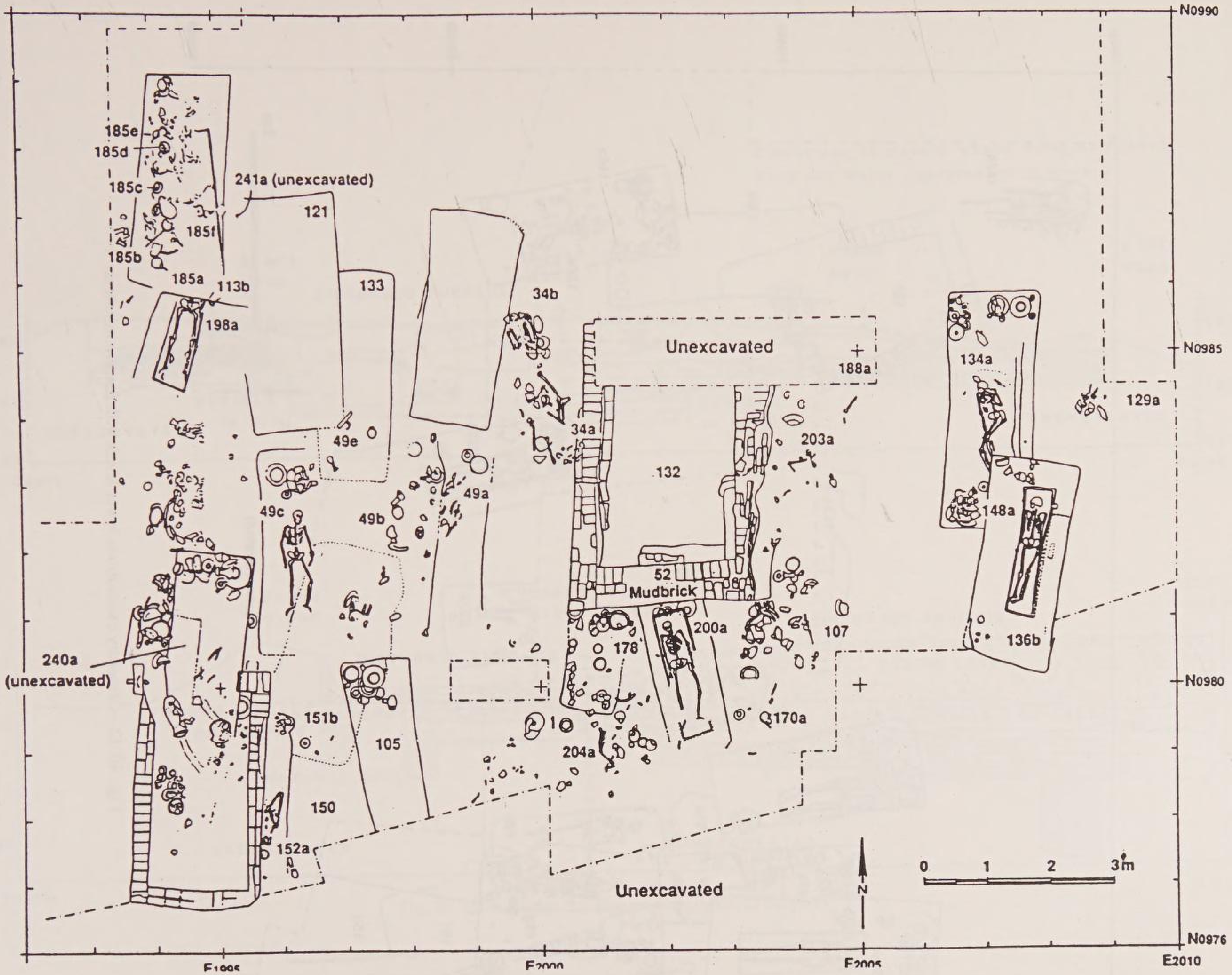
N0990
N0985
N0980
N0976
E1995
E2000
E2005
E2010
185e
185d
185c
185b
185a
185f
241a (unexcavated)
121
133
113b
198a
34b
Unexcavated
188a
129a
134a
148a
136b
49e
49c
49b
49a
34a
132
203a
52
Mudbrick
200a
107
178
170a
204a
240a
(unexcavated)
151b
105
150
152a
Unexcavated
N
0
1
2
3m

Fig. 40.11. Cemetery excavations upper levels with feature numbers.

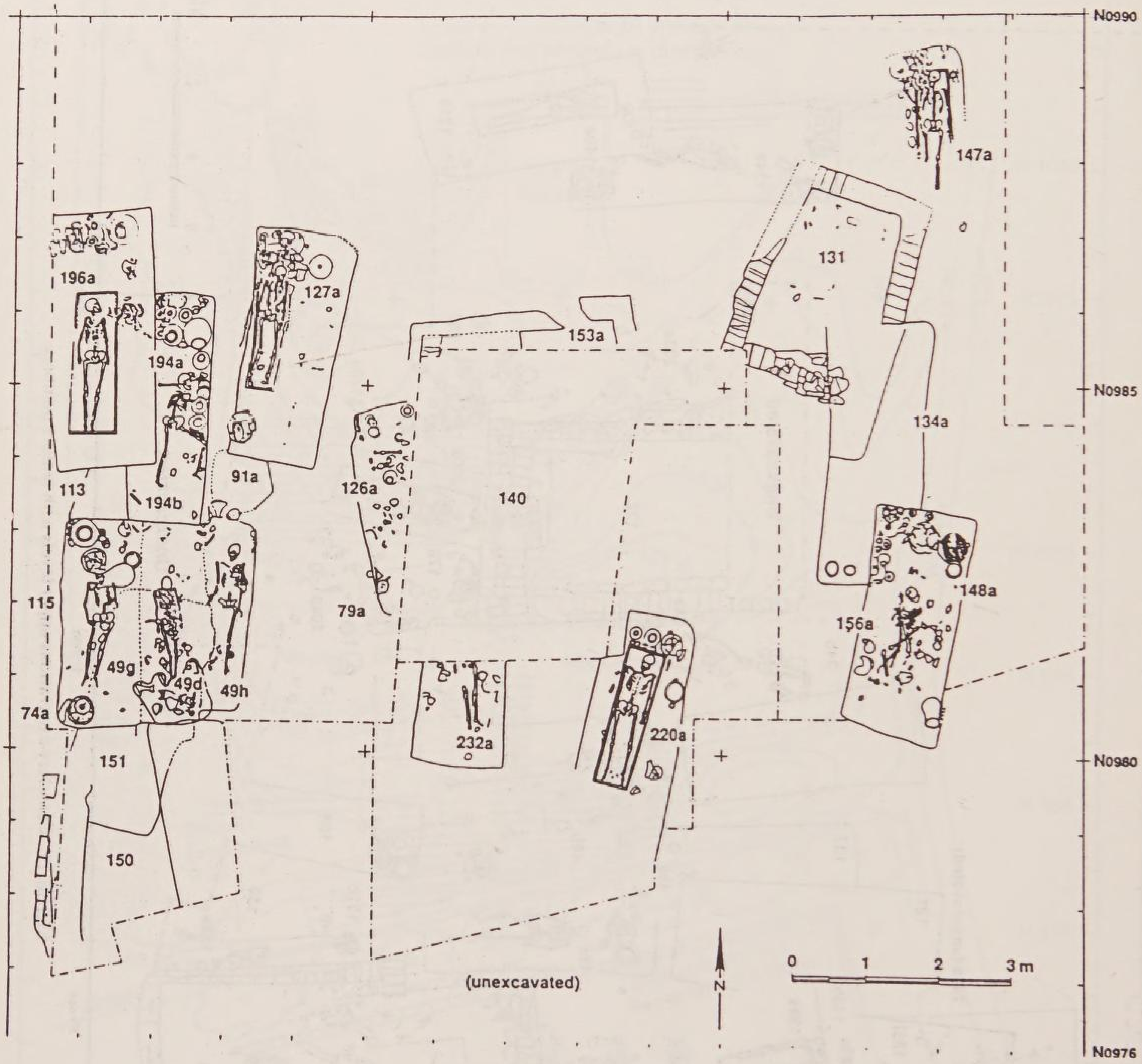
N0990
147a
131
153a
196a
194a
127a
134a
N0985
126a
140
113
194b
91a
115
148a
156a
79a
49g
49d
49h
74a
232a
220a
N0980
151
150
(unexcavated)
N
0
1
2
3 m
N0976

Fig. 40.12. Cemetery excavations lower levels with feature numbers.

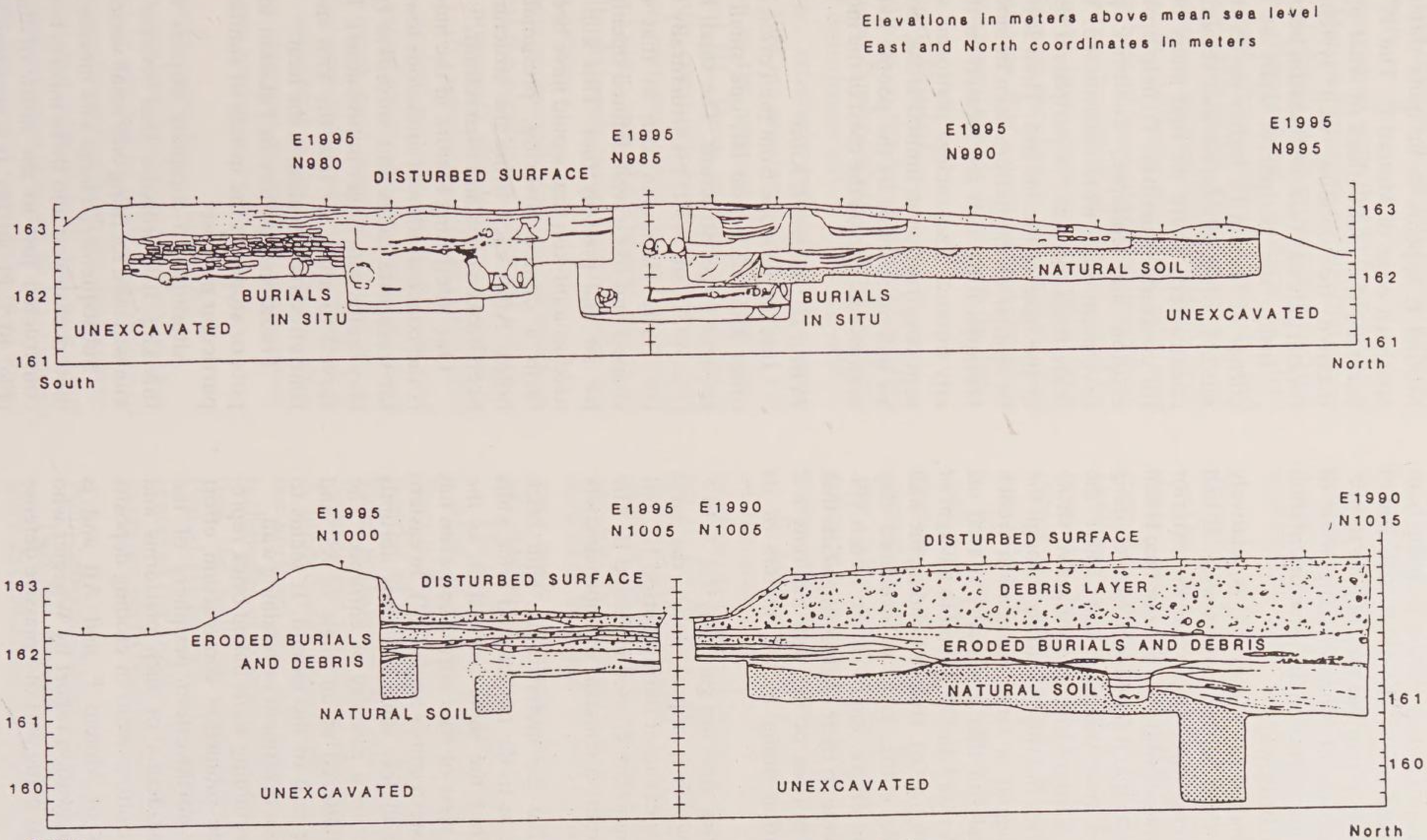
Elevations in meters above mean sea level
East and North coordinates in meters
E1995
N980
DISTURBED SURFACE
E1995
N985
E1995
N990
E1995
N995
163
162
161
South
BURIALS
IN SITU
UNEXCAVATED
BURIALS
IN SITU
NATURAL SOIL
UNEXCAVATED
163
162
161
North
E1995
N1000
E1995
N1005
E1990
N1005
E1990
N1015
DISTURBED SURFACE
DISTURBED SURFACE
DEBRIS LAYER
163
162
161
160
ERODED BURIALS
AND DEBRIS
NATURAL SOIL
UNEXCAVATED
ERODED BURIALS AND DEBRIS
NATURAL SOIL
UNEXCAVATED
161
160
South
North

Fig. 40.13. Cemtery Excavations North South Section.

to have been repaired during Period III using both mudbrick and baked brick. The exact sequence of these repairs is not certain but they appear to precede the construction of long retaining walls of baked brick that are aligned in the same orientation as the earlier mud brick walls.

The earliest baked brick wall [51] is relatively thin, being only 45 to 50 centimeters wide. It had been rebuilt at least three times and the exterior edge is heavily eroded, while the interior face is still intact. This suggests that it functioned as a retaining rather than as a free standing wall. Later the Harappans built a larger and more massive structure, wall [33]. They did this by cutting through the thin wall and digging a large foundation trench down into natural soil that essentially shaved off the edge of the Period I and II mound to a height of 3.5 to 4 meters (Fig. 40.6). Before building the wall the architects laid a thin layer of overfired clay nodules along the entire length of the trench (Pl. 40.12). It is a tribute to their engineering skills that the level of the bottom of the wall has only a 2 centimeter variation along the 45 meters of its exposed length.

The baked brick sizes are generally 7.5 × 16 × 32 centimeters which is approximately the same size as the mud bricks used during Period III, but smaller than the mud bricks used in Period II. The brick size ratios remain constant at approximately 1:2:4.

This wall [33] is 2.5 meters wide, with brick bonding the same as in the earlier mud brick walls of Period II. It has the same orientation as the earlier walls (10° west of true north) and even has the same northwestern comer angle (83°). In eastern extension is nine meters long and ends abruptly with no evidence for a gateway or entrance. The exterior face is battered at an angle of 85° and rested against the face of the mound. It seems to have functioned as a revetment or retaining wall.

Such massive retaining walls baked brick represents a large-scale municipal construction effort along the entire northwestern periphery of the mound. The construction of such platforms and retaining walls is quite evident in eroding deposits from other parts of Mound E and AB and is reported in the excavation report by Wheeler who interpreted them as being part of a massive defense system.

The evidence for peripheral walls around Mound E appears to be quite different along the southern edge of Mound E. The 1990 excavations revealed the foundations of what appears to be a massive free-standing wall system including a formal gateway (see 1990 season below).

Inside the peripheral walls at the northwest corner of Mound E, higher up on the crest of the mound, other platforms and retaining walls were constructed. There we find many building phases for domestic structures. To help protect them from erosion and collapse, mudbrick platforms and revetment walls were constructed. These differ in scale from the massive peripheral structures found at the base of the mound. Their layout appears to be similar to the pattern seen in modern houses of Harappa town that are located on the edge of the city mound. The ancient platforms seem to represent construction in limited areas, possibly built on an individual basis by the people living in the precarious location on the crest of the mound.

Period III: Mound E Kilns

Just up the slope from the Period II kiln are two other kilns of Period III, one small and one subsequent larger structure. The small Harappan kiln (Pls. 40.13 and 40.15) is structurally different from the Early Harappan kiln in that it is teardrop shaped and has a well defined opening to the west for air and possibly fuel. This kiln was probably used as a pit-kiln that would have been plastered to form a domed covering, presumably with vent holes. After each firing the structure would have been broken open and then rebuilt.

One interesting feature in the mouth of the kiln is the concentration of numerous low fired triangular terracotta cakes and *mushtikas* (potato shaped clay lumps with finger impressions). They may have served to allow air into the kiln and at the same time effectively sealing in the heat.

Traditional potters in Pakistan today place old pots or stones at the mouth of similar kilns for this particular purpose.

Although no complete objects were found in this kiln, it is probable that because of its size the kiln was used for firing only small vessels or figurines.

Subsequently, a large kiln measuring almost two meters east-west and three meters north-south, was constructed just to the north of the smaller kiln (Fig. 40.5, Pl. 40.16). It is teardrop shaped with an extended opening to the south for air or fuel. The construction, and operation, of this kiln is unusual and is under study.

In layers associated with this kiln we found a wide range of Mature Harappan pottery that represent the types of vessels being produced in the kiln. These include dish-on-stand, medium to large painted pots and jars, perforated vessels and medium to large plain wares. There is no evidence for the production of pointed base goblets or smaller plain wares. In addition a clay chuck mold used for making the base of large storge jars was found. Also associated are fragments of hematite used for making pigments, bone spatulas and worn stone blades for trimming the pottery before firing, and patches of fine clay that may represent the areas where the potters were mixing or wedging the clay.

Period III: Top of Mound E

The excavations on the top of the northwestern corner of Mound E revealed that underneath the thick layer of disturbance left by the brick robbers there are large, relatively undisturbed Harappan structures. In 1988, an area ten by eight meters was exposed down to the uppermost preserved structures of Period III. There are multiple levels of habitation units constructed of baked and mud bricks along an east-west street that was equipped with drains and sump pits. Many hearths and redeposited hearth materials were found within and around the structures.

The artifacts recovered from the architectural contexts reveal the presence of domestic activities such as food processing and cooking. In addition, remains of craft activities such as chert tool manufacture, steatite working, bone working, and possibly the manufacture and processing of agate and carnelian beads were found in the vicinity. At this stage of our analysis we cannot say if these craft activities are associated with the domestic activities, or if they represent workshops, or are secondary dumps from workshop areas.

Period III: Southwestern Slope of Mound E

A small excavation during the 1988 season (Fig. 40.1) revealed *in situ* baked brick architecture of Period III. A significant find from the debris covering the structure is a large steatite seal with a bull motif and Harappan script (Fig. 40.19.1a). Only six other seals with this animal motif have been found at Harappa.

During the 1990 season, extensive excavations were conducted at another location along the slope revealing the foundations of what appears to be a massive peripheral wall with a gateway, a north-south street, and houses with a wealth of associated artifacts (see 1990 season below).

Period III: Mound AB (Fig. 40.1)

One stratum of Period III remains—a brick drain, sump pit, and fired brick paving—was exposed in the upper part of the 1987 test pit at the southwestern corner of the mound. This habitation level was built on top of a deep accumulation of debris and wash deposits that extended down to natural soil.

More extensive excavations were conducted in 1987 and 1988 in a deep gully in the east-central portion of the mound (Pl. 40.17). The original excavation area was ten by ten meters, but this area was reduced when well preserved Period III structures were encountered along both edges of the gully—mainly fired brick drains and wash floors.

In 1988 a brick well was discovered in the center of the gully. The well is constructed of specially made wedge-shaped bricks and the interior diameter is 1.2 meters. The wedge-shaped bricks are marked with a double incised line on the exterior edge (Pl. 40.19). The markings do not correspond to any specific placement in the wall of the well and may have indicated to the builders that the bricks were made specifically for this well as opposed to any other well.

The interior of the well was excavated in 1989 to a depth of about six meters from the existing top layer of bricks. The removal of the debris from the interior of the well revealed ominous cracks in the lower portions of the structure. For safety reasons, clearing was suspended and the well top was sealed. A limited area against the outside of the well, on the northern side, was excavated to investigate the techniques of construction (Pl. 40.18). It appears that the well was constructed sometime late in Period III by excavating a large square pit in the center of the mound. The exact construction procedures are yet to be determined.

Plain between Mound E and Mound AB

Two test trenches (two by three meters each) were excavated on the plain level between Mound E and Mound AB. In both trenches the natural soil was reached at a depth of 3.5 to 4 meters below plain level (161.10 AMSL). In the upper levels of these trenches is evidence of historical period structures made from reused Period III (Mature Harappan) bricks. Below these late structures the strata were primarily pits and debris dumps filled with Period V (Late Harappan) and then Period III (Mature Harappan) pottery. In one level associated with Period III there was a paving of crushed brick and pottery that could possibly represent a roadway. The lowest level of silty wash above the natural soil contained small fragments of Period I and II (Early Harappan) pottery and gray bangle fragments.

Period III Cemetery: The Excavations

The major objectives of the cemetery excavations were to document Harappan burial practices in more detail than had been done by earlier excavators, and to obtain new information on population variation, diet and disease during Period III. The general location of the Period III cemetery was discovered by K.N. Shastri and excavated by him from 1937-41. Subsequent excavations were carried out by Wheeler in 1946 (Wheeler 1947 and 1968) and Mughal in 1966 (1967).

In 1986 a systematic stratified random sampling strategy for determining the extent of the cemetery was implemented. A five-meter grid was laid out over the entire area selected for investigation and one by two meter random text pits were excavated in each five meter square to determine the nature of the stratigraphy and to locate human skeletal remains.

The results of the test pits and horizontal exposures in the cemetery area indicate quite clearly that the main concentration of *in situ* burials is along an east-west axis just north of the modern irrigation ditch at the northwestern corner of the Harappa Museum grounds, in other words, along east and westward extensions from the central area where the earlier excavations were conducted. To the south of the ditch, within the Museum Campus, we found disturbed and eroded burials consisting mainly of pottery (Pls. 40.6 and 40.7). To the east are eroded sediments with a thick overburden of Period III debris, while the northern limit of the primary context burials can be defined on the basis of our recent excavations and those of Wheeler (1946). To the west the cemetery extends for at least another 60 to 70 meters into modern cultivation. These fields have been irrigated for at least the last 60 years, but distinct north/south oblong patches of lighter colored vegetation suggested the presence of subsurface features. The uppermost levels of debris that protected the cemetery to the west have been removed by the farmers to get to the rich alluvium. This has exposed the uppermost burials to intensive plow zone disturbance and these burials have been almost totally obliterated. However, the lower burials are in quite good condition and indicated the intensive use of this part of the site for burial purposes. Due to limited time and the presence of standing crops, further excavations were not conducted in these fields.

Cemetery Stratigraphy

The ancient Harappan burials were dug into natural soil of what may be a Pleistocene terrace or ridge. The ancient land surface was heavily eroded during and following the Period III (Mature Harappan) occupation of the site, resulting in the displacement and erosion of large areas of the cemetery. An area forming an east-west ridge just north of the irrigation ditch is the uneroded "A" horizon of the Period III occupation. The ancient surface slopes away in all directions, but the major directions of erosion appears to have been south to north and west to east (Fig. 40.8). Eroded burials and debris form layers of variable thickness which lie unconformably on the natural soil. The eroding surfaces of the cemetery were covered by a massive layer of Period III debris (Pl. 40.2)—mostly ceramics (between 30 and 40 percent of which are the well known pointed base goblets).

Burial Types

The Period III burial customs as reflected in this cemetery appears to have been relatively standardized. All of the primary burials are in distinct rectangular pits oriented north-south (Figs. 40.9 and 40.10). Also there are numerous examples of bone having been collected and dumped or buried in the fill of a grave shaft or on the sloping surface next to a grave shaft in ancient times. These collections of bone are invariably mixed with broken burial pottery and possibly represent the clearing of earlier burials to make room for subsequent inhumations. These groups of disarticulated bones and broken pottery that do not belong to primary burials, are referred to as secondary context/fill to distinguish them from actual secondary burials.

Another context for the presence of human bone is the eroded surface of the cemetery that was subsequently covered by the thick debris deposits (Pl. 40.8). These eroded burials that are no longer *in situ* are referred to as being in secondary context/wash or secondary context/debris. Secondary context/debris means that the human bones were found in the debris layer itself, but because all of the bone in the debris layer occurs at the interface between the debris and the eroding cemetery surface, this bone is assumed to have come from the cemetery itself rather from debris brought from the habitation areas for disposal.

It appears that there were several methods of burial with a wide variation of burial goods. The most common form of primary burial was extended and supine, with the head to the north and the feet to the south. The orientation of undisturbed burials ranges from 9° East of true North to 2° West of true North.

Several burials had traces of wooden coffins that were approximately half meter wide and 1.7 to 1.9 meters long with walls 2 to 3 centimeters thick. The outlines of the coffins were indicated as dark stained soil and unfortunately no samples of the actual wood are preserved. Two coffin burials had what appear to have been wooden lids. Samples from these are under study.

The burial goods included varying quantities of pottery vessels usually arranged at the head and foot of the grave shaft (Pls. 40.20 and 40.21). In some burials the pottery was placed in the grave first and then partially covered with soil. The body was placed level with the top of the pottery, after which the grave was completely filled with soil. The subsequent weight of the soil often crushed the coffin and underlying pottery, resulting in a disturbed burial. Some of the later burials that cut into and disturbed the earlier burials were furnished with only a few vessels or no burial pottery at all.

Preliminary analysis of the ceramics suggests that there may be different relative proportions of painted to undecorated pottery from the lower burials and the upper burials. It is difficult at this early stage of the ceramic analysis to be certain of this. One complicating factor is that of differential preservation. This has been recorded in the skeletal samples as well as in the pottery. Pottery with excellently preserved surface can be found associated with pottery whose surface are severely disintegrated. This phenomenon is under study. It is crucial to the final understanding of stylistic development in the pottery industry.

An impressive range of ornamentation is seen in these burials, including shell bangles, a copper ring, steatite/serpentine disc beads, carnelian and lapis lazuli beads, short cylindrical gold beads, black stone amulets and a unique head ornament made of three shell rings, a jasper bead and numerous strands of thousands of steatite microbeads. At this stage it is difficult to discuss the presence or absence of significant status indicators, but the overall impression is that persons buried in this cemetery were not from greatly diverse socio-economic segments of society. However, there were some individuals with relatively simple burials, containing modest numbers of pottery and no ornaments, while others had more pottery, and quite striking ornaments. There does not appear at present to be a direct correlation between the use of wooden coffins and the amounts of pottery or ornamentations accompanying the burials.

An example of a simple burial (Lot 220, Feature 220a) is a man buried in a coffin with no ornaments and only nine pottery vessels arranged at the head of the pit. Another burial (Lot 198, Feature 200a) was of a woman, also in a coffin, with two shell bangles on the left arm and five carnelian beads lying on the right side of the pelvis. Beneath her was a collection of nine pottery vessels.

In contrast to these relatively simple burials, is a burial of a man (Pl. 40.3; Lot 136, Feature 147a) in a coffin with over a dozen vessels arranged at the head of the pit and additional vessels along the side of the pit. On his left wrist was a shell bangle and near the right hand a carnelian bead. The most striking ornament, mentioned above, was found lying to the right of his head, namely the complex of two or three shell rings, a jasper bead and thousands of tiny microbeads twisted together in circlets or bunches (Pl. 40.22). This collection was taken to the Smithsonian's Conservation Analytical Laboratory in Washington for cleaning and consolidating by our project Conservator Donna Strahan. A special case was constructed for it and the headdress is now on display in the Harappa Museum.

Another example of a more elaborate burial is of a woman who had apparently died during or soon after child birth (Pl. 40.5; Lot 197, Feature 194 a and b). The infant skeleton was found immediately beneath the lower right leg. There was no trace of a coffin, but the skeleton looked as if it had been disturbed after interment. This burial had 33 pottery vessels arranged at the head and alongside the body. Many of the vessels were painted with elaborate black designs on a red background. A lead/orpiment rod (orange to yellow mineral) was found near her head, possibly used as a pigment for personal decoration.

Yet another coffin burial was of an older man (Pl. 40.4; Lot 194, Feature 196a). The constricted attitude of the body suggests that he might have been bound in some type of tightly wrapped shroud. Most striking was the fact that he had a magnificent necklace of 340 steatite disc beads and three beautiful stone beads, of jasper, onyx and serpentine, with gold caps on the ends. The pottery with this burial was all of plain or red slipped wares, but two crudely formed unfired vessels were found crushed beneath one of the larger vessels.

PRELIMINARY NOTES ON THE 1990 SEASON

The fifth season of research was completed just shortly before the deadline for this manuscript. The following notes have been abstracted from the end of season report prepared in the field by J.M. Kenoyer.

There were three main research objectives for the fifth season: (1) expansion of the excavations in the northwest corner of Mound E to obtain a larger exposure of the Early and Early/Mature transitional levels; (2) to investigate the nature of the Period III remains along the southern edge of Mound E and to search for indicators of Early Period I-II remains in that area; and (3) to continue the surface surveys of Mound E in search of intact Period III remains and traces of the easternmost extension of the Period I-II occupations.

Objective 2 received the most attention and produced the most significant new discoveries. The major north-south gully on the southern slope of Mound E was selected for investigation. As suspected, the present-day gully reflects an important detail of the Period III settlement, namely, it follows a well-defined street that appears to run north-south through the entire mound. Impressions of cart tracks were visible in upper levels of Period III and in the lowest level association with Early sherds.

The southern end of this street leads to an impressive east-west mud brick wall system belonging to Period III. Two superimposed stages of this wall were revealed. The later stage ranges from 5.4 to 6.5 meters wide and has been traced so far for more than 73 meters. Piercing the wall system is what appears to be a major gateway with an opening of some 2.8 meters. The associated wall in the later phase is 9 meters wide at the gateway. Traces of an original fired brick facing have been found bounded to the mud brick wall on the eastern edge of the gateway. Just how the north-south street articulates with the wall and gateway requires further excavations. Nonetheless, the discovery of this apparently free standing wall system provides an unexpected contrast to the massive facing walls, revetments and platforms seen at the northwestern corner of Mound E and around Mound AB.

House structures of Period III were discovered along the eastern edge of the street. The original fired brick walls were robbed, probably in the last century, but the floors and interior features are preserved virtually intact. One of these houses was constructed on a small mud brick platform. The platform has three distinct post holes that may have been for roof supports. A small kiln or oven and several pits filled with domestic debris were also found on the surface of the platform.

Most important, a total of eleven objects with Harappan script were found in the fill of the pits and in the floor deposits within this house. These include two steatite intaglio seals (one complete, one broken), with the common unicorn motif and short inscription; three identical rectangular molded faience tokens with script on both faces; one molded rectangular token with script only on one face; one triangular token and one lunate token with script on both faces. In addition, two inscribed and fired steatite tokens and one terracotta cone with a crudely inscribed inscription were found. The discovery of these objects in closely associated strata represent the use of at least four different types of objects with writing by the occupants of the house during a relatively short period of time. Additional seals, tokens and sealings were discovered in the street levels in front of the house and in other houses excavated to the north along the eastern edge of the street.

Because of the importance of the discoveries along the southern edge, less time than originally planned was available for expanding the excavations at the northwestern corner of Mound E. However, a total of 15 by 15 meters of occupational levels from the Early Period I-II to the Mature Harappan Period III were exposed. In the Early levels several mud brick walls aligned east-west and north-south were found. Above these is a series of strata representing the transitional phase from the Early to the Mature period. In these transitional levels were found hearths and working floors containing debris related to ceramic production, as well as large quantities of carbonized grains and other plant remains.

The flotation process used for retrieving the palaeobotanical samples yield in addition to large quantities of animal bone, particularly very small bones which are seldom recovered even by the fine dry screening of excavated sediments. A preliminary scan of the materials revealed much fish bone, bones of small animals, birds, rodents, reptiles, and even crab claws. These minute finds when combined with the analysis of the larger bones recovered from the excavations, will provide the first comprehensive picture of animal exploitation in the Harappa region.

CONCLUDING REMARKS

The Harappa Project has only scratched the surface of the massive urban center of Harappa. And as we have scratched, systematically to be sure, we have become aware of how much larger the ancient settlement was than earlier reports had indicated and how much more complex is the understanding of it. Many professional lifetimes of excavation and analysis will be required to extract from the battered body of Harappa the secrets of its origins, its mature life, and its demise.

Nevertheless, these five years have been extremely successful. We now know the precise location of the pre-urban settlement at Harappa and we have a large body of data for addressing questions regarding urban development and chronology. The excavations in the cemetery area and the various domestic contexts of the site have also provided a vast amount of new information relating to the customs and daily life of the Harappans. The studies of the ancient soils, plants and fauna are adding a crucial dimension to our understanding of the interactions between the inhabitants and the natural environment.

Thanks to the cooperation of the Department of Archaeology, we have had the opportunity to apply modern excavation procedures at one of the earliest and largest urban centers of the ancient world. The excavations have provided specialists with new materials for study and upon which to apply new analytical and interpretative approaches. Furthermore it has provided field training opportunities for students and specialists from both Pakistan and the United States who will be able to continue to develop new research on the origins and character of the ancient cultures of South Asia.

II. BIOLOGICAL ANTHROPOLOGY

The study of the skeletal remains from the cemetery is being conducted by four physical anthropologists who participated in the 1987-88 excavations. These investigators are specialists in four areas of human skeletal biology: morphometric analysis—Dr. Kenneth A.R. Kennedy (Cornell University), dental anthropology—Dr. John R. Lukacs (University of Oregon), palaeopathology/palaeonutrition—Dr. Nancy C. Lovell (University of Alberta) and discrete trait analysis—Mr. Brian Hemphill (University of Oregon). In addition to their long experience with South Asian materials, they were selected because of their diverse methodological and analytical approaches. The Harappa project would provide a unique opportunity to apply and test a variety of methodologies on freshly excavated samples. Some preliminary results from these studies are published in *Pakistan Archaeology 1989*. An updated summary is presented below but the tentative nature of some of the interpretations must be kept in mind until the final reports are published. This will require integration of the skeletal and dental data with all the rest of the archaeological data from the cemetery excavations.

PALAEODEMOGRAPHY

Kenneth A.R. Kennedy and Nancy C. Lovell

The analysis to date of the skeletal remains excavated during the 1987-1988 seasons has identified twenty-five complete, or nearly complete, discrete individuals, from primary contexts. Nine additional crania, six mandibles, and hundreds of complete and fragmentary disarticulated skeletal elements were also recovered. (Dental remains are described separately by John Lukacs, below.) The age and sex distribution of the 25 discrete individuals is as follows:

Age:		
Subadult	(< 16 yrs)	2
Young adult	(16-34 yrs)	13
Middle-aged adult	(35-55 yrs)	6
Older adult	(> 55 yrs)	1
Adults of uncertain age		3
		N = 25
Sex:		
Males		11
Females		10
Uncertain		10
		N = 25

Preservation is a problem with the cemetery skeletal materials. The alkaline soil has destroyed much of the cancellous bone and has altered the structure of cortical bone in skeletons buried close to the present day ground surface. The ratio of relatively complete to fragmentary skeletons has been estimated by Kennedy to be about 1:2. The diagenetic problems have prevented the chemical analyses from providing the information anticipated (discussed later in this report).

MORPHOMETRIC ANALYSIS

Kenneth A.R. Kennedy

Every skeletal fragment, complete bone, and individual skeletal specimen has been described by the two procedures of morphometric analysis: measurement of size and shape variables using precision instruments, and morphological assessment using anthroposcopic analysis. Tabulations of measurements using the metric system include absolute length/breadth dimensions, angles and indices. A photographic record accompanies the written word, and certain specimens are represented by radiographic plates. Preliminary study of the Harappa data indicates that the predominant biological features of this population are long and narrow cranial vaults with cranial elevation low relative to maximum cranial length. Faces are generally broad and straight in profile, but there is some forward protrusion of the tooth-bearing regions. Noses are generally narrow, but there is a low incidence of crania with medium to broad noses. The shape of the eye sockets is rectangular. Palates are usually narrow and shallow, and all lower jaws are long and narrow. Bones of the postcranial skeleton reveal a population of medium stature height, relatively low skeletal robusticity and trunk/limb bone ratios that indicate a linear body build with relatively short trunks and moderately long arms and legs.

Analysis of the data is now underway at Cornell University's Human Biology Laboratory. Dr. Kennedy is working on the following specific problems:

1. Stature estimates based upon statistical regression formulae using limb bone lenths.
2. Identification of markers of occupational stress. These are marks on bone that are recognized as relating to habitual activities during life which produce variations of development in size, shape and location of ligament attachments on bone. Kennedy is a specialist in the interpretation of such markers.
3. Comparison of the 1987 and 1988 data with previously excavated skeletal series from Harappa, and with other skeletal series associated with the Harappan Civilization (Mohenjodaro, Chanhudaro, Lothal, Rupar, Kalibangan, etc.)

Morphometric analysis of the Harappa series, when completed, will provide new information about the biological adaptations and diversity of the ancient people whose cultural achievement was the Harappan Civilization. These data are not obtainable from the archaeological record alone, although the biological anthropology of a population, living or ancient, requires a sensitivity to the role culture plays in behavior and the expression of physical variables.

PALAEOPATHOLOGY

Nancy C. Lovell

Identification of pathological conditions of the skeletal remains was made in the field through macroscopic and radiographic examination. Inflammatory lesions are exhibited by only seven individuals; six of these display periostitis on their long bone shafts, a condition that cannot be attributed to any particular infectious agent periostitis is usually, however, believed to be the result of a chronic, systemic infection. One of these individuals also exhibits a lesion suggestive of a localized infection, perhaps secondary to trauma, on a toe bone (Pl. 40.9).

Only four skeletons display evidence of traumatic injury. One individual displays a healed fracture of the left scapula, immediately below the shoulder joint. Another has a healed fracture of the distal right radius, plus a healed rib fracture. A third also has a healed rib fracture (Pl. 40.10). A fourth individual shows a compression fracture in the spine. In addition, one middle-adult female exhibits a compression fracture of a vertebra in the thoracic region of the spine, which appears to be secondary to osteoporosis.

Three individuals exhibit benign neoplastic growths, in the form of small "button osteomas" on the cranial vault. A fourth person has a similar, small, elongated growth on the shaft of the fourth metatarsal of the right foot (Pl. 40.11).

Congenital or developmental anomalies, exhibited by three individuals, include spina bifida, scaphocephaly, and partial sacralization of the fifth lumbar vertebra.

No cases of nutritional inadequacy, such as rickets, scurvy, or anemia were identified, however, there are two cases of arrested growth lines (Harris lines) appearing on long bones (visible on x-rays), which suggest that growth during childhood was halted temporarily in these individuals. Growth arrest may be caused by malnutrition and/or other physiological stress such as an acute illness. However, growth arrest lines may be remodeled with age. If the Harappa sample contained more younger age individuals it is probable that a greater number of growth arrest events would be recognized.

Arthritis is the most common pathological condition and appears in the joints of the knee, hands, feet and spine. Arthritic lesions in these locations are common among almost all people of the world and are usually associated with advancing age. Cervical and lumbar vertebrae exhibit similar frequencies and severities of arthritis although the joints that are principally affected differ: the lower back region has more severe arthritis due to disk problems while the neck region has more severe involvement associated with the interlocking apophyseal joints that are not cushioned by disks. The most severe cases of arthritis, two cases of bony fusion of adjacent vertebrae, are found in the neck region. The high frequency and severity of arthritis in the cervical spine is unusual and may reflect the stress of habitually carrying loads on the head, a common practice in South Asia today.

These frequencies of pathological conditions should be considered minimum estimates due to the poor preservation of some of the skeletal material. However, the overall impression is that the health of those Harappans interred in Cemetery R37 was very good.

PALAEODIETARY RECONSTRUCTION

Nancy C. Lovell

This aspect of the project was designed to reconstruct subsistence at Harappa using stable carbon and nitrogen isotope analysis of the organic portion of human bone. The results of isotope analysis in 1987-88 were spurious, and biochemical assays indicated that collagen preservation was very poor, at least in skeletons recovered from the upper levels of the cemetery. The possibility of differential preservation as a factor in the stable isotope results will be examined by comparing the histomorphology of bone from burials at different locations and depths within the cemetery. New procedures for sample purification are also being investigated.

The suitability of the trace element analysis of the inorganic part of human bone for dietary reconstruction is also under study. Radosevich (1989, 1990) suggests that no useful dietary information can be obtained from stronium/calcium ratios in Harappan bone, due to contamination from the burial matrix. Additional trace element profiles of human and animal bones and soil samples from the cemetery have been evaluated by one of Lovell's graduate students, D. Link, (1990). Results of his analysis tend to support Radosevich's claim. Observed values for all elements analyzed (Aluminum, barium, calcium, manganese, sodium, strontium, and zinc) are much larger than the expected physiological levels, in some cases by a factor of ten. The diet-indicating elements, barium, strontium and zinc, are present in the burial soil in substantial amounts, suggesting that the observed levels of these elements in the bones represent both simple contamination and ionic adsorption and substitution from the soil. However, severe diagenesis did not preclude detection of gender-based dietary differences (Radosevich 1989, 1990) using trace element analytical methods.

DENTAL ANTHROPOLOGY

John Lukacs

The Sample

While human skeletal remains have been recovered from Harappan contexts for several decades, analysis of the dental remains have been sorely neglected and valuable information regarding Harappan dental health conditions and dental morphology were routinely omitted from these earlier investigations. This report summarizes the major pathologies and odontometric features of the Harappan dentition as represented in the sample recovered from the recent excavations. While the comparative and interpretive analysis of these data are still in progress, new insights into Harappan oral health, dietary patterns and tooth size are forthcoming.

The dental sample on which this study is based was recovered from two different burial contexts—primary and secondary. Primary contexts include undisturbed, or minimally disturbed, burials which contain a complete skeleton in its original burial position. Sixteen primary burials provided dental evidence for inclusion in this investigation. Loose teeth from secondary contexts not found in association with other skeletal parts are referred to as "isolated" dental remains. Excluded from this tabulation of dental remains are the numerous fragments of individual teeth, including chips of enamel, dentine and incomplete root fragments.

Dental remains from primary burials comprise 48.1 percent of the dental sample, secondary dental remains constitute 36.9 percent of the sample, and isolated dental elements make up only 15.0 percent. When the dental sample is broken down by sex, males (37.4 percent) and females (38.3 percent) are equally represented, but nearly one-quarter (24.2 percent) of the sample comes from skeletal elements of unknown sex.

DENTAL PATHOLOGY

The preliminary assessment of dental pathology at Harappa is divided into two parts. Part one reports the prevalence of dental disease at Harappa on the basis of the number of individuals affected by each disorder (individual count method). The second part provides a more detailed investigation of the prevalence and distribution of dental caries in the Harappan skeletal series (tooth count method).

The prevalence of dental diseases at Harappa are presented by sex and for the total skeletal series (Fig. 40.12). The sample on which these frequencies are calculated includes all "primary" context burials ($n=16$) and many of the more complete "secondary" context burials ($\bar{n}=26$). Of the dental disorders documented in this study gross linear enamel hypoplasia was the most frequent, affecting 72.2 percent of 36 individuals for which observations were possible. The least frequent condition in the series was hypercementosis (4.9 percent). Dental afflictions of low prevalence in the total sample include abscesses (18.4 percent) and exposure of the pulp chamber (17.1 percent). One individual (H87/137/148a) was afflicted by an exceptionally high incidence of dental abscesses, six in the maxilla and five in the mandible (Fig. 40.27). But if this unique individual is excluded, the inci-

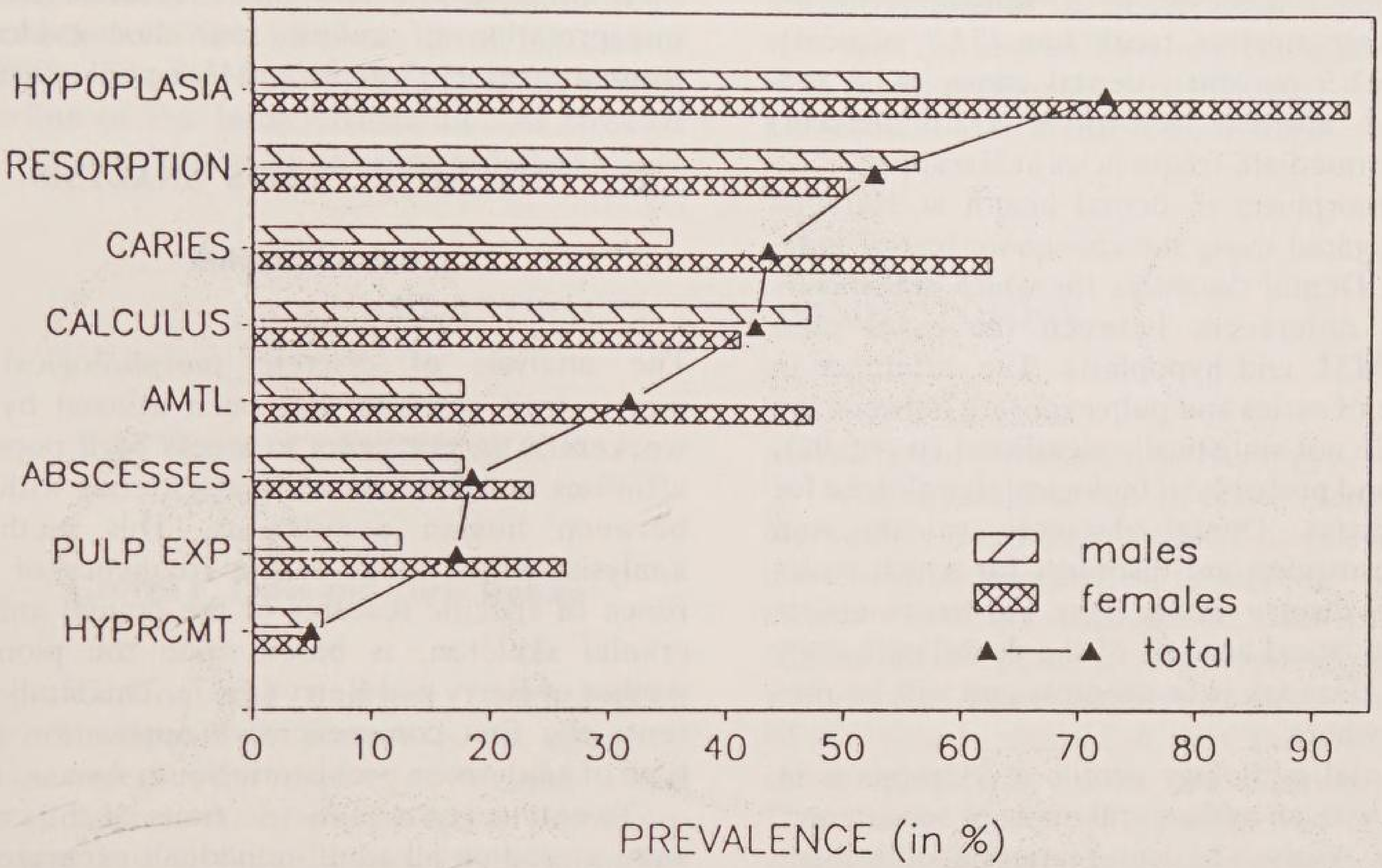

Fig. 40.14a. Prevalence of dental diseases at Harappa (individual count).

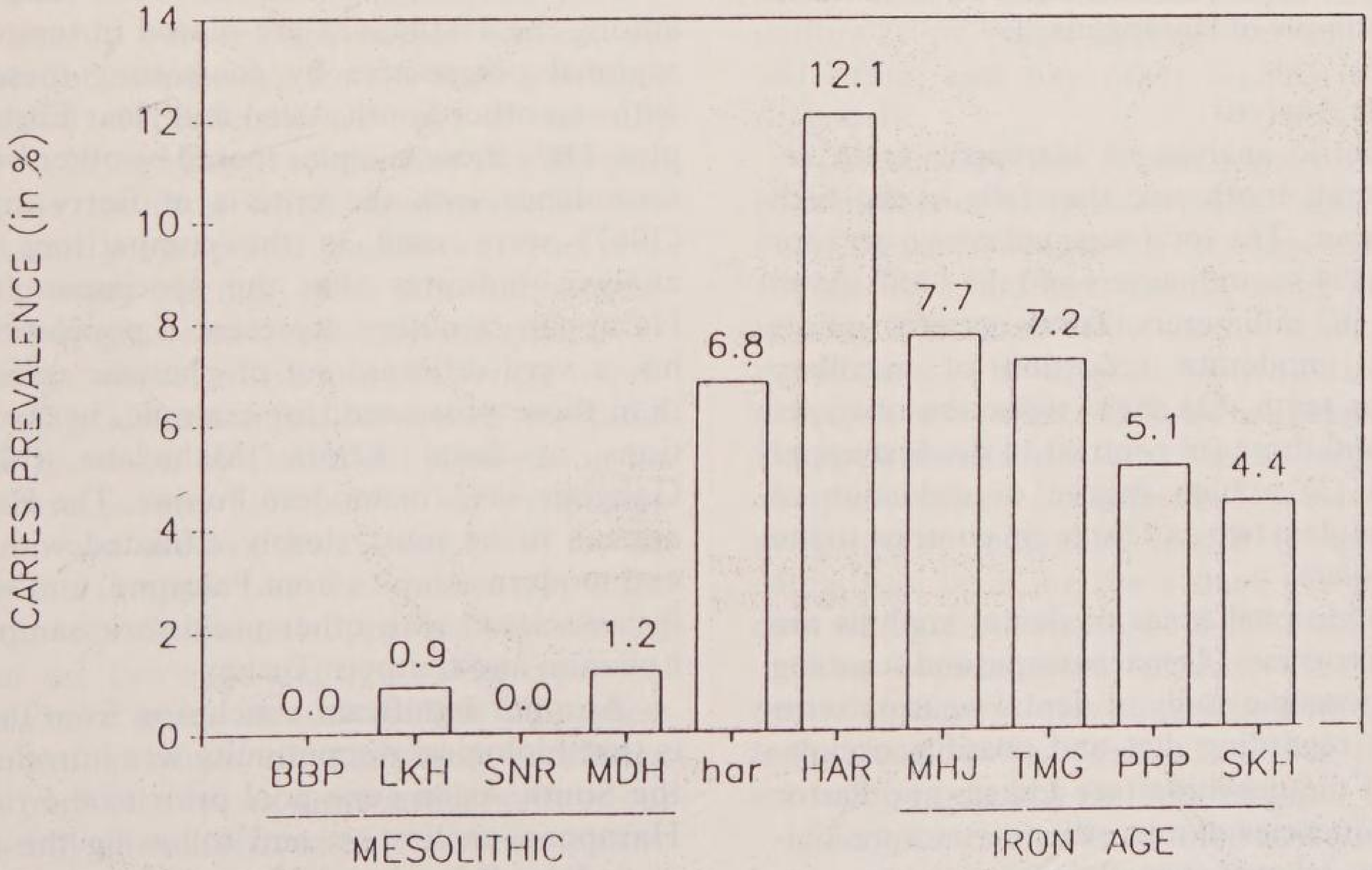

Fig. 40.14b. Caries prevalence among prehistoric South Asians (tooth count).

dence of dental abscesses in the remaining sample is rare. Ante-mortem tooth loss (31.7 percent), calculus (42.5 percent), dental caries (43.6 percent), and alveolar resorption (52.6 percent) exhibit intermediate frequencies at Harappa.

Sex dimorphism in dental health at Harappa was investigated using the chi-square test of independence. Dental disorders for which statistically significant differences between the sexes exist include AMTL and hypoplasia. The difference in prevalence of caries and pulp exposure between the sexes, while not statistically significant ($p > 0.05$), was large and probably of biological significance for the Harappans. Dental abscesses, calculus and alveolar resorption are disorders for which males and females display similar rates. Further comparative and statistical analysis of the dental pathology pattern at Harappa is in progress and will be presented elsewhere.

The dental pathology profile at Harappa is in agreement with an agricultural ~~mode of~~ subsistence. (Fig. 40.12). Analysis of dental caries by tooth count method found 51 carries teeth in a sample of 751 teeth, yielding a 6.8 percent caries rate. When corrected for bias caused by anti-mortem tooth loss, the tooth count caries rate increases to 12.1 percent, a more accurate estimate of the true caries rate for this sample of Harappans.

Odontometric Analysis

Odontometric analysis of Harappan teeth reveals an overall tooth size that falls in the high microdont range. The total summed crown area for Harappa is 1194 sq. milimeters and the tooth material index is 182 milimeters. Tooth specific indices indicate: (1) moderate reduction of maxillary lateral incisor teeth, (2) slight reduction of upper molars two and three (in contrast to the first upper molar), and (3) a high degree of reduction of mandibular molars two and three (in contrast to the first lower molar).

Several additional areas of dental analysis are currently in progress: (1) macroscopic and scanning electron microscopic study of dental wear patterns for evidence regarding diet and possible occupational uses of the dentition (see Lukacs and Pastor 1988), (2) frequencies of many discrete morphological variations (shovel-shaped incisors, extra cuspules of molars etc.,) in order to estimate the degree of biological relationship between the Harappans, their predecessors and their successors; and (3) interpretation of unique individual evidence of traumatic injury (Lukacs and Hemphill 1990).

DISCRETE TRAITS ANALYSIS

Brian Hemphill

The analysis of discrete morphological non-metric trait variation has been utilized by many workers in recent years to assess both population affinities and microevolutionary trends within and between human populations. This method of analysis, which looks at the frequency of occurrence of specific features of the cranial and post-cranial skeleton, is based upon the pioneering studies of Berry and Berry (1967). This study represents the first comprehensive application of this type of analysis on prehistoric South Asians.

Twenty-seven non-metric traits of the cranium were scored on all adult individuals excavated during 1987-1988. The details of the methodology will be given in the final report of the physical anthropologists that is scheduled to be completed by the end of 1992.

The frequency of cranial non-metric traits among the Harappans are placed in temporal and regional perspective by contrasting these results with ten other South Asian and Near Eastern samples. Only those samples scored by other workers in accordance with the criteria of Berry and Berry (1967) were used in the comparisons. Cluster analysis indicates that the specimens from the Harappan cemetery represent a population which has a very different set of phenetic relationships than those possessed, for example, by the populations at Sarai Khola, Mahadaha (Mesolithic Gangetic site), or modern Punjab. The Harappans appear to be most closely affiliated with ancient and modern samples from Palestine, and secondarily associated with other prehistoric samples from Lebanon and southern Turkey.

Another significant conclusion from these tests is that biological discontinuity was introduced into the South Asian gene pool prior to the rise of the Harappan civilization and following the neolithic period as defined at Mehrgarh. A second discontinuity occurred sometime before the Late-Bronze/ Early Iron Age settlements at Sarai Khola. The historical, cultural and demographic implications of these conclusions are immense involving among other major questions those relating to the origins and decline of the Indus civilization. As stressed above, the conclusions must be regarded as highly tentative, due to the small sample sizes, and the fact that the results have not yet been integrated with the data from the other physical anthropological studies or the archaeological data.

III ARTIFACTS: TYPES AND TYPOLOGY

POTTERY: CLASSIFICATION AND DESCRIPTION

George F. Dales and Chris Jenkins

The classification and analyses (technological, stylistic, functional) of pottery is an especially important aspect of the research at Harappa. These studies all address the broader issues of continuity and change through time. Because of the enormous quantities of ceramic materials (almost one million sherds from the five seasons) and the variety of information preserved in them, they are the single-most important category of remains for these studies. Very little, for example, is certain about the relationship between the earliest settlers and the population responsible for the fully developed urban period. Superficially we refer to the early ceramics as being related to the Kot Diji-Jalilpur-Sarai Khola tradition which does provide some temporal and geographical framework. The ceramics can provide essential other information relating to technological and stylistic continuities.

The only comprehensive attempt to date to provide an analytical classification system for Indus pottery is the work by Dales and Kenoyer on the Mohenjodaro pottery (1986). The basic classificatory system was used as the starting point for the ceramics at Harappa. As we anticipated, differences immediately became apparent between the pottery of the two sites and new vessel types and variations have been identified. The differences may be the product of functional, aesthetic, temporal or other factors which are all part of our broader study of the relationships between the two sites. The important point is that the classification system developed with the Mohenjodaro pottery has been flexible enough to adapt easily to the new and different forms found at Harappa.

With the assistance of Chris Jenkins (U.C. Berkeley), a thorough study is being made of the classification procedures for all the vessels and sherds from the excavations. Just as with the Mohenjodaro pottery, the proportional ratios of the vessels (measurements and profiles of the body of the vessels, devoid of rims and bases) provide the starting point for the classification procedure. Because of the large quantities of complete or restorable vessels, it is possible to better define the basic form categories (jar, pot, bowl, or dish) than it was using the more fragmentary Mohenjodaro material.

We are also making more use of secondary attributes, such as rim and base forms, surface modifications (slips, paint, incising, scraping, etc.), unusual firing, and any other features that may be diagnostic.

The classification system applies fundamentally to complete or restorable vessels. More often, however, one is confronted in the excavations with just sherds. Rim and base sherds, being more distinctive in form than body sherds, assume a special importance. The original Mohenjodaro classification system for rims and bases has been improved at Harappa thanks to having a much larger sample of complete vessels for analysis. It is now possible to assign most individual sherds to specific vessel categories, or at least to a small cluster of categories, with greater assurance than before.

The technological aspects of the Harappa pottery industry—raw materials, forming and firing techniques, and specialized surface treatments—are being studied by Dr. Rita Wright.

Special attention is devoted as well to developing comparable classification and descriptive system to the Early and to the Late (Cemetery H) pottery.

FIGURINES

George F. Dales

Terracotta figurines of anthropoid and non-anthropoid creatures are abundant at Harappa. But without written documents of religious/mythological nature, and without the presence of recognizable religious or cultic structures, the original functions and significance of the figurines remain obscure. At the initial stage in the our study of the figurines we are developing systematic criteria for the classification and description of the various types and styles of representations. From this, with the addition of contextual and distributional information, some functional understandings may be forthcoming.

Non-Anthropoid Figurines

Some 550 complete or partial non-human figurines, and identifiable fragments of, were recorded during the first four season's. The basic problem is that of identifying the species of the quadrapeds (Figs. 40.13, 40.14, 40.15). With the exception of the rhinoceros, the humped bull, and the dog, each of which has unique body characteristics, it is impossible to identity species from the body alone. It is the horns, snout, and facial details that are the species indicators. Richard Meadow, the expedition's zooarchaeologist, is working with Dales to develop a coding system for recording distinct attributes of the figurines. The correlation studies are not yet complete but tentatively the study suggests the following breakdown:

Animal Types	Quantity	% of Total
Quadraped mammals	133	24.5%
Unidentified		
Horned quadrapeds	88	16.2%
Unidentified		
Cattle	164	30.3%
Buffalo	58	10.7%
Rhinoceros	34	6.3%
Sheep/Goat	15	2.8%
Other (Dog, Cat, Primate, Bird)	50	9.2%
(Turtle, Elephant, Unicorn)		

These figures, as yet tentative, suggest that cattle outnumber sheep/goat by 10 to 1; cattle outnumber water buffalo by 3 to 1; and cattle outnumber rhinos by 5 to 1. Of the 164 identifiable cattle, Bos indicus outnumber other types of cattle by 2 to 1. The further identification of examples within the large unidentified categories will no doubt modify these percentages.

Anthropoid Figurines

The anthropoid figurines present quite a different problem. Usually, identification of sex is no problem. Body configurations are different as are facial features, ornamentations and head-dresses. Standing male figures do have applied breasts but they are flat discs rather than the conical forms seen on the female figures (Fig. 40.16). There are two examples of what appear to be hermaphrodite figures but they require further study.

During the first four seasons, 497 anthropoid figurines, or parts were recorded. Of these, 393 (79.1 percent) are females, 73 (14.7 percent) are males, and 31 (6.2 percent) are too fragmentary to determine the sex. Female representations are thus about five times more plentiful than males.

Their distribution is also of interest. Most of the figurines came from the cemetery area during the second and third seasons but not a single figurine was found in primary context in a burial. All the objects were found in the thick debris layer covering the cemetary. Of these figurines, 76.7 percent are female and 17 percent are male. The situation is quite different, however, with the fourth season when the excavations concentrated on the western slope of Mound E. Only 58 figurines were found, 86.2 percent of which were female, 3.5 percent were male, and 10.3 percent are as yet unidentified.

Attention is focusing on the manufacturing procedures used for the figurines as well as on their types and styles. A peculiar manufacturing detail has been recognized for most of the female, and some of the male figures. They were made in vertical halves which were stuck together before the jewelry ornamentation and hip bands were applied and the figurines fired (Fig. 40.17). This join is quite evident on many of the figurines. Several examples where the join is not visible on the surface were x-rayed and the join shows clearly. The reason for employing this peculiar manufacturing procedure is not clear.

And there is a second fascinating aspect to the

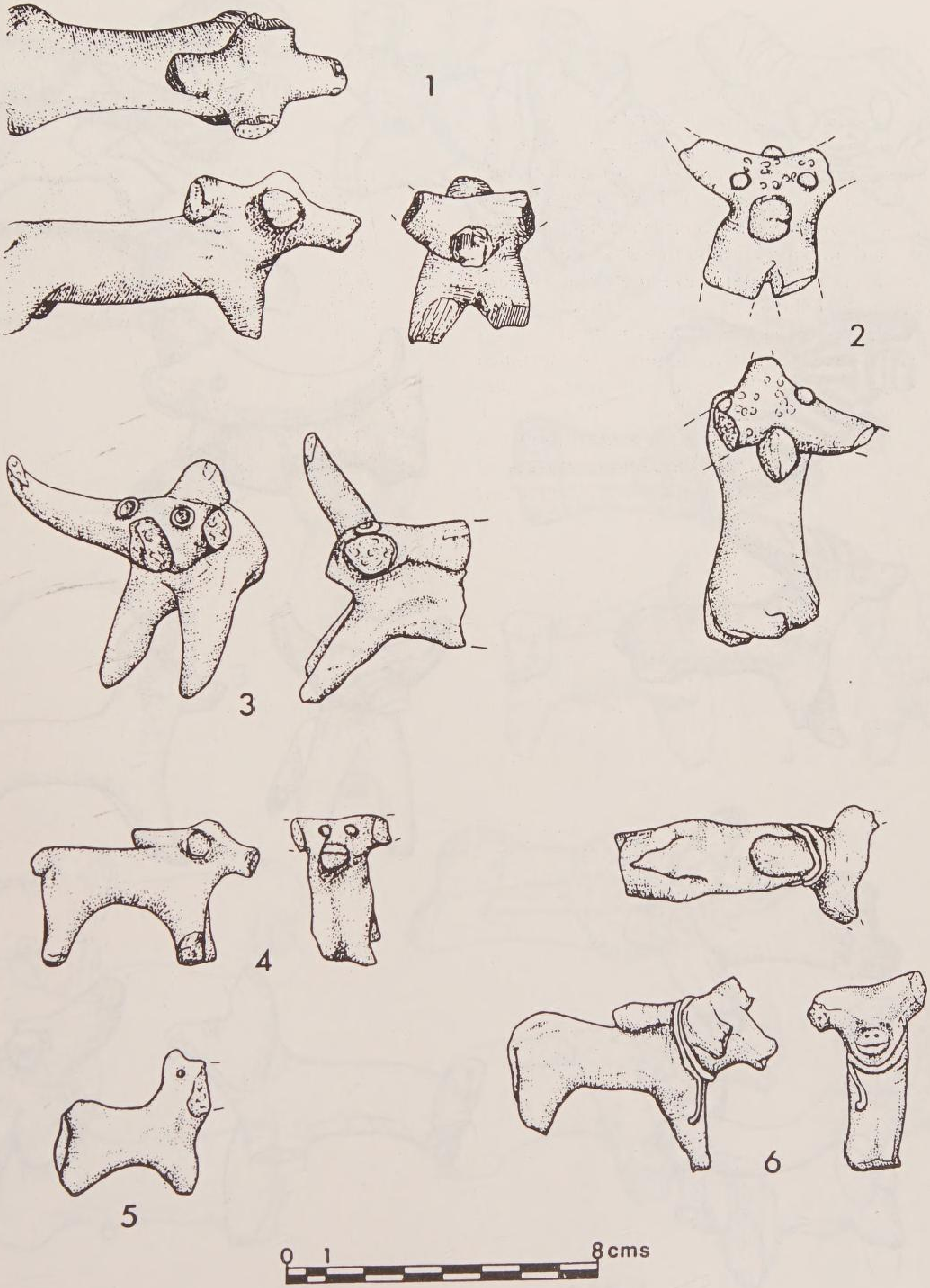
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Fig. 40.15. Terracotta animal figurines zebu.

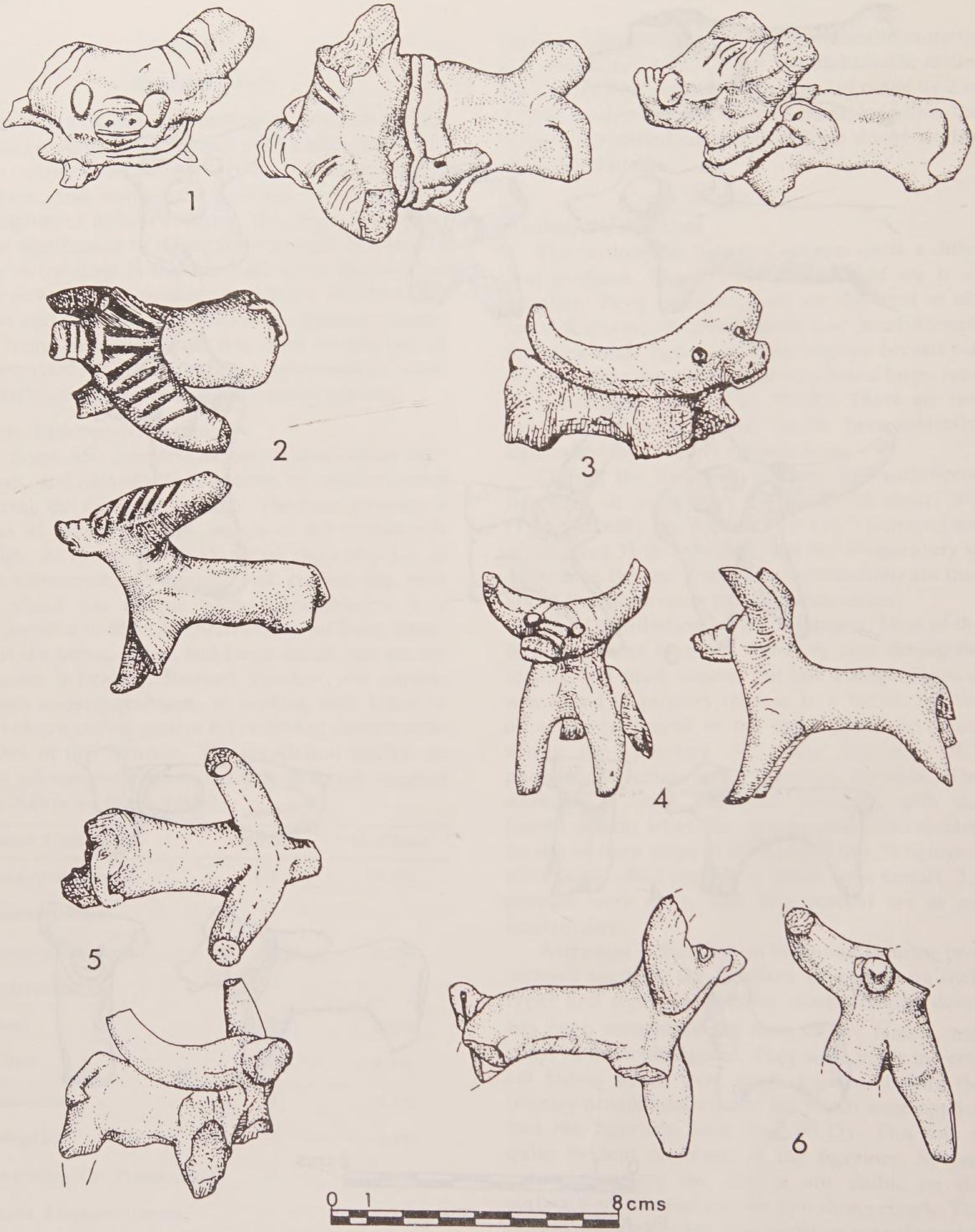
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Fig. 40.16. Terracotta animal figurines: (1), (2) Water buffalo. (3-6) Bovine of uncertain identification uncertain indentification.

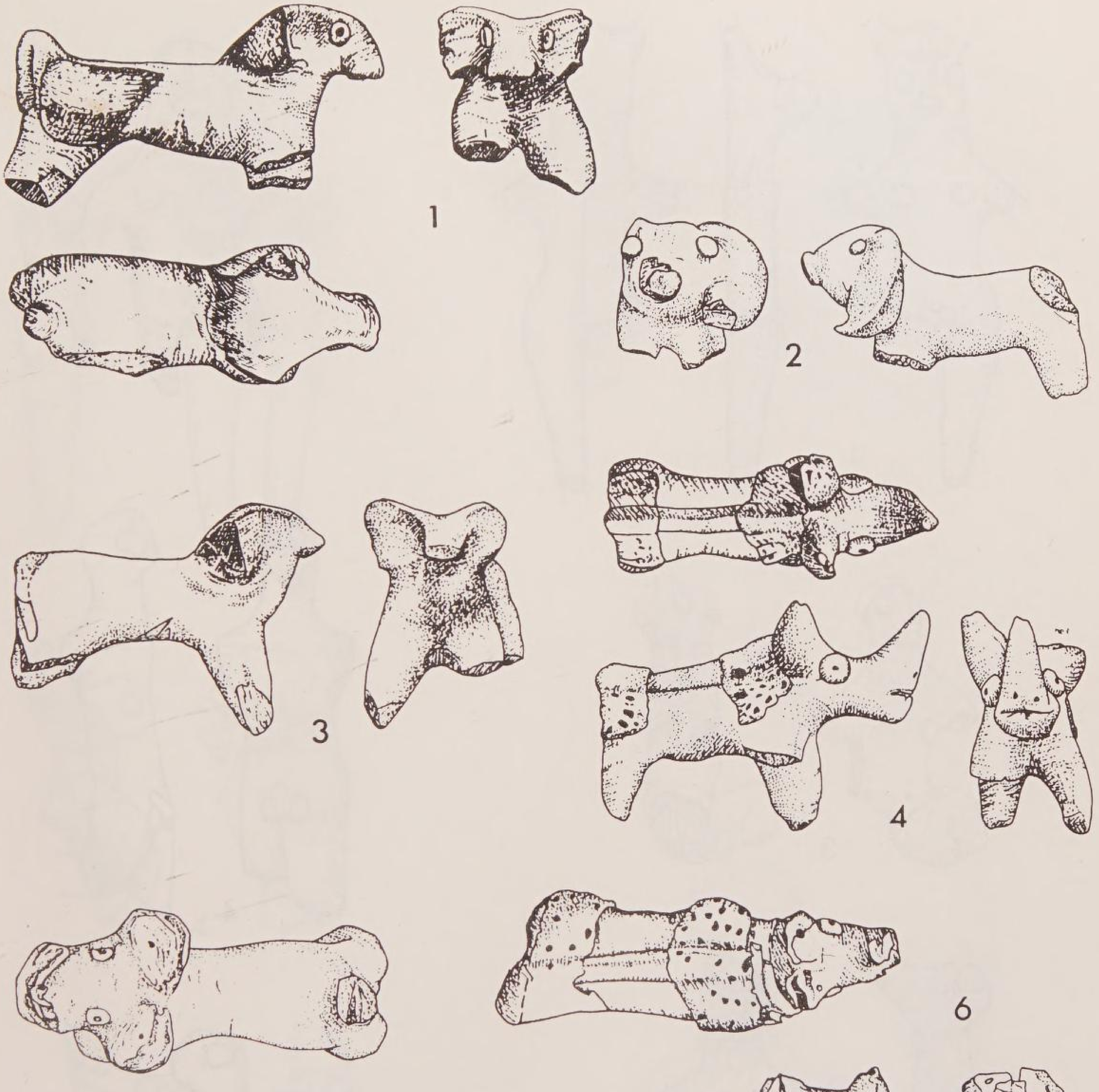
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Fig. 40.17. Terracotta animal figurines: (1-3) Sheep. (4), (6) Rhincoeros. (5) Hyena.

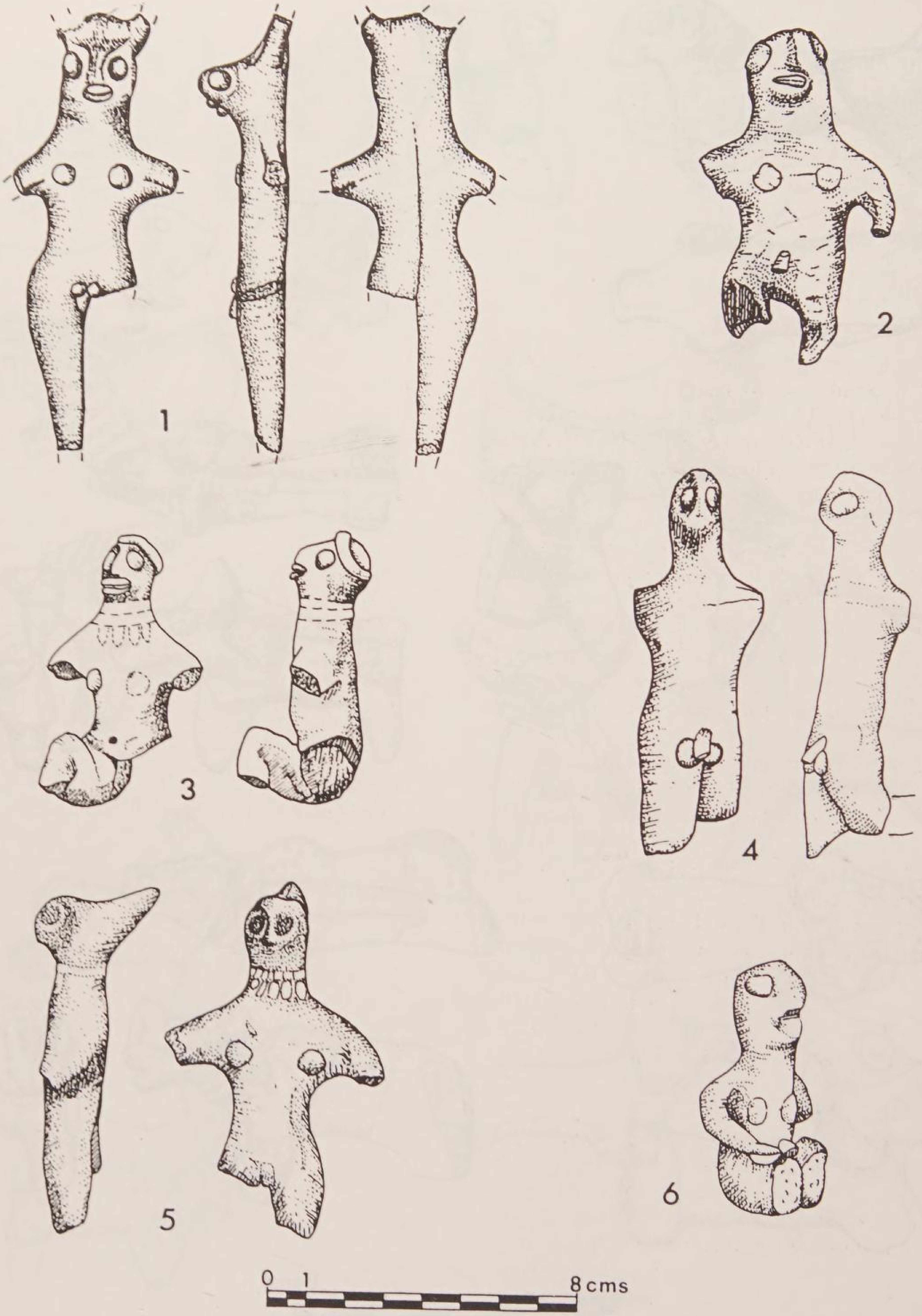
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Fig. 40.18. Terracotta anthropoid figurines: Early (Periods I-II).

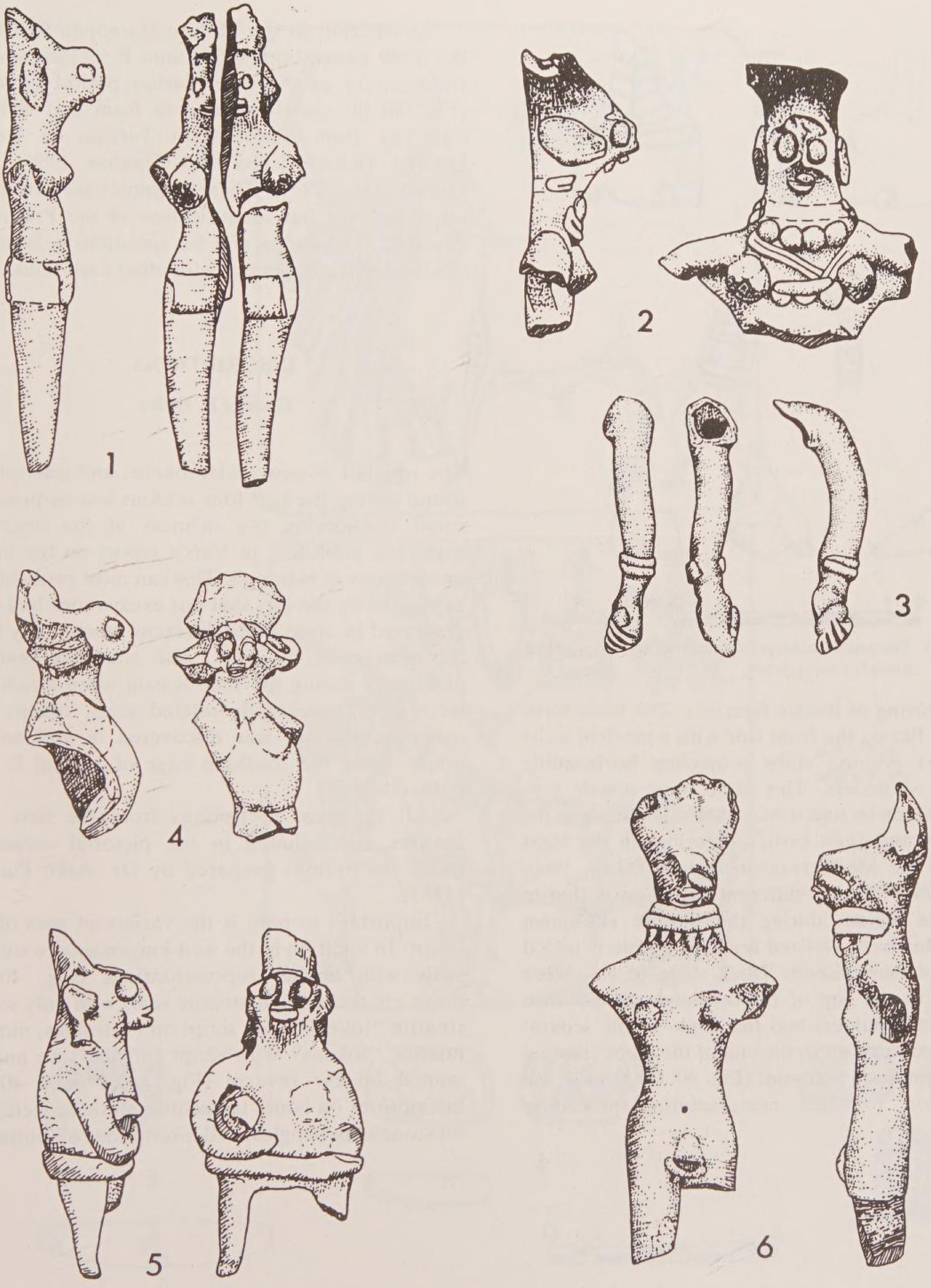


Fig. 40.19. Terracotta anthropoid figurines: Male.

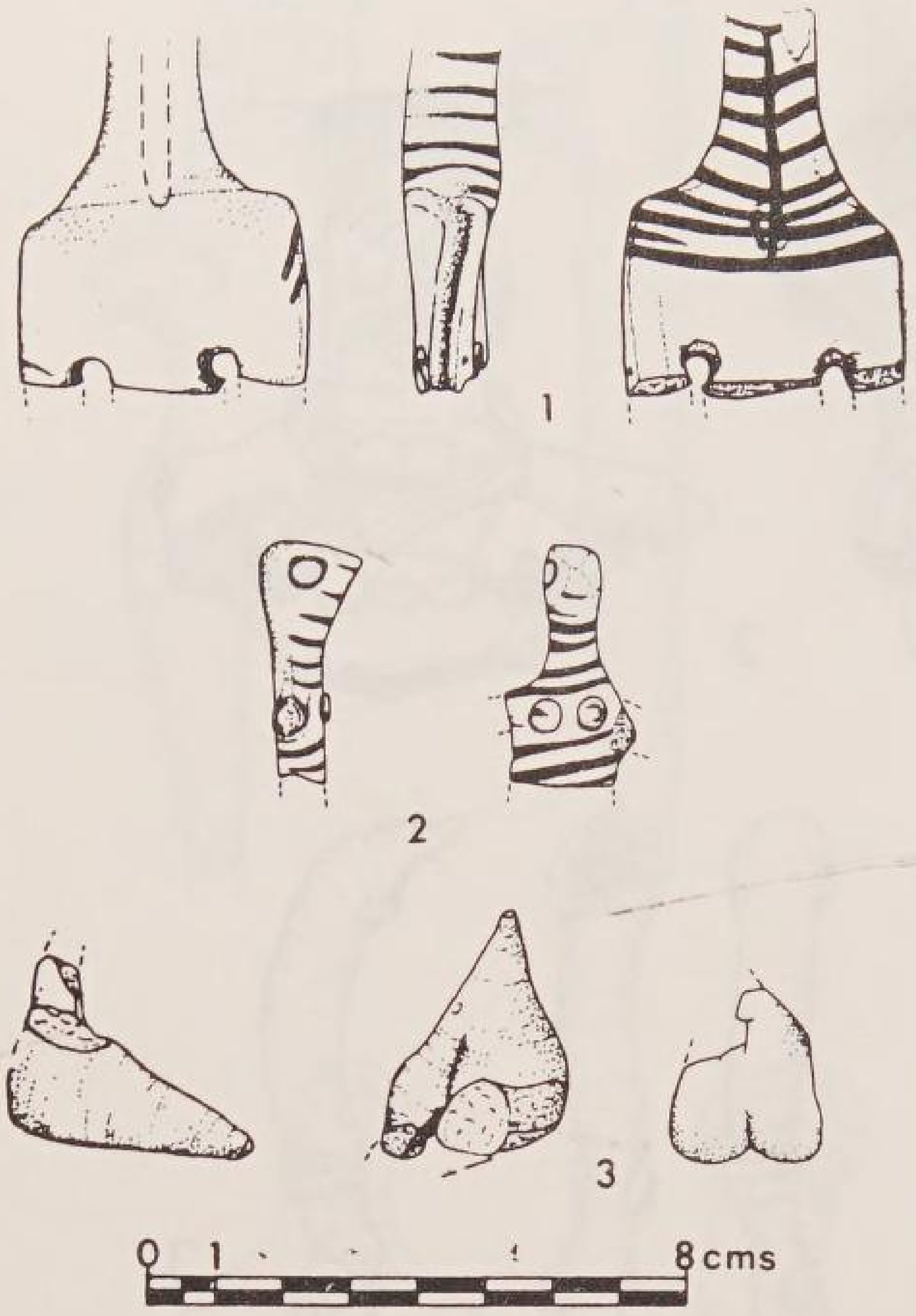


Fig. 40.20. Terracotta anthropoid figurines: female, showing manufacturing detals.

manufacturing of female figurines. The basic torso is almost flat on the front side with a pinched waist and short pointed stubs projecting horizontally from the shoulders. This same basic female representation can be traced back in time and sapce to the Neolithic, and even earlier, figurines in the Near East and the Mediterranean region (Dales, 1960, 1963, 1974). What is different, and new is that in the Indus region, during the Mature Harappan period, this basic stylized female figurine is added on to and embellished. Thick strips of clay were attached to the top of the arm stubs to produce prominent shoulders and the arms—made separately—were stuck on to the end of the stubs creating what resembles a ball joint (Fig. 40.17). Again, the explanation for this manufacturing procedure eludes us.

In addition to the Mature Harappan figurines, the 1989 excavations on Mound E yielded several fragmentary examples of earlier period figurines (Fig. 40.18) closely related in form and style to figurines from Sheri Khan Tarakai in Bannu District (Khan, Knox and Thomas 1988), and Gumla (Dani 1971). These examples are extremely important for our identification of the Pre-urban deposits at Harappa and for questions relating to contacts and interactions with other early sites.

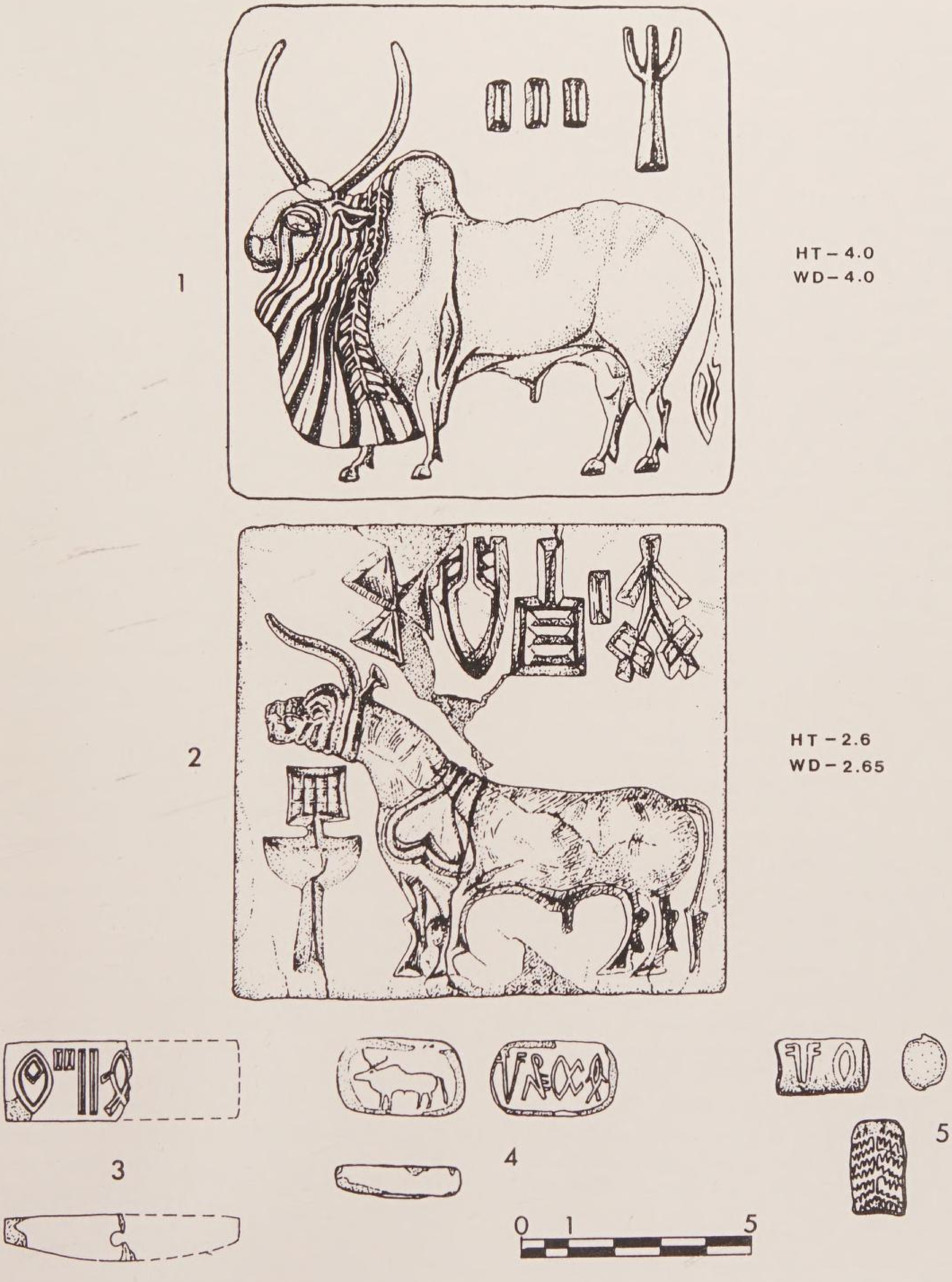
INSCRIPTIONS

George F. Dales

The number of new seals, tokens, and inscriptions found during the first four seasons was surprisingly small considering the richness of the inscribed materials published in Vats's report on the initial excavations at Harappa. This can most probably be explained by the fact that our excavations had concentrated in areas quite different functionally than those exposed by Vats. The situation changed drastically during the 1990 season when a rich collection of contextually related seals, tokens and other inscriptions was discovered in and near a house along the southern edge of Mound E (see Addendum).

All the new inscriptions from the first four seasons are included in the pictorial corpus of Indus inscriptions prepared by Dr. Asko Parpola (1991).

Important to note is the variety of uses of the script. In addition to the well-known square steatite seals with animal representations (Fig. 40.19), there are rectangular steatite seals with only script; steatite "tokens" with script on both sides; molded faience "tokens" with script on one side and an animal on the reverse (Figs. 40.19 and 40.20); inscriptions on bone, terracotta, metal objects, and on stoneware bangles, and inscriptions on pottery.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HT – 4.0
WD – 4.0
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HT – 2.6
WD – 2.65
3
4
5
0
1
5

Fig. 40.21. Inscribed Objects: (1), (2), (3) are steatitie seals. (4) and (5) are faience "tokens".

tools were found wrapped together with fiber possibly collected for reprocessing or remelting. Small circular mirrors were also found associated with the Period III burials.

The analysis of the copper/bronze artifacts from Harappa is being conducted at MASCA (University Museum, Philadelphia) by Vincent C. Pigott and Stuart J. Fleming. At the present time eleven artifacts have been studied to determine the elemental composition of the metals, the microstructural features of the metal and the technology involved in the production of each specific object. Preliminary findings indicate the presence of relatively pure copper artifacts, objects made from arsenical copper and one object made from tin-bronze (see Fig. 40.21) for the elemental (PIXE) analyses of four samples). The techniques of manufacture and metal processing include casting, cold hammering, annealing and possibly drawing.

Precious metal (gold, silver) is also found. Preliminary analysis of samples is being done by J.M. Kenoyer and Jim Burton using the Electron Microprobe at the Department of Geology, University of Wisconsin-Madison.

LITHIC STUDIES

J. Mark Kenoyer

Another area of archaeometric analysis is the study of raw materials used to manufacture pecked and ground stone implements and chipped stone tools. A large sample of raw materials has been collected from Harappa for characterization and comparative analysis with rock samples from known source areas. These samples are being studied by J. Mark Kenoyer and Jim Burton at the University of Wisconsin—Madison using x-ray defraction and electron microprobe.

Also, Kenoyer has been conducting experiments with modern replicas of some of the tools, specifically the drills. These experiments are necessarily to develop a comparative collection of wear and use surfaces.

STONE BEAD MANUFACTURE

J. Mark Kenoyer

Harappa has produced a wide variety of stone beads made from a range of different raw materials. None of these materials are available in the alluvial plains and therefore all of the stone beads represent trade contacts with distant source regions. Some of the raw materials, for example carnelian, banded agate and amazonite appear to derive from the region of modern Gujarat, India. Lapis lazuli was probably obtained from the Chagai Hills region of Baluchistan or the mines near Badakshan in Afghanistan. Various colors of steatite could have been brought from Baluchistan to the west or from the Rajasthan ranges to the east. Variegated jaspers and limestones could have been acquired in the Kohistan or Baluchistan region as well as from Rajasthan, Kutch or Saurashtra. The identification of specific source areas is being done through the collection of modern examples of raw materials for comparative studies using petrographic characterization and trace element analysis.

Studies of bead manufacturing techniques are also under way. Some of the raw materials are microcrystalline silicates and can be easily flaked, while other crystalline materials were fashioned by grooving and splitting, sawing, or simply grinding. Each type of raw material requires a different manufacturing process. Special attention is focused on the technique used in the manufacturing of micro-beads (Pl. 40.22).

Every bead from the current excavations at Harappa is being studied to determine the type of drilling technique used. Silicone impressions of the drill holes are made and these casts are then studied under the scanning electron microscope at the Department of Geology, U.W. Madison. No evidence for the use of abrasive has been found in the hard stone beads studied so far. The softer stone beads, made from steatite, sandstone, lapis lazuli etc. appear to have been drilled with a rough drill, probably made from chert or chipped jasper (pthanite). Some of the short biconical beads made from rock crystal and carnelian were drilled using a unique technique that has not yet been replicated. The interior hole is very rough and chipped, suggesting a pecking technique.

An exquisite example of the jewellers skills is seen in the teardrop shaped carnelian gem set in gold (Pl. 40.23).

FAUNAL STUDIES

Richard H. Meadow

Richard Meadow, assisted by James Knight in 1989 and Tonya Largy in 1990, continued his work on the faunal remains from Harappa as part of a larger study of animal exploitation during the Harappan Period in Pakistan funded in part by the National Science Foundation and in part by the Harappa Project.

The purpose of carrying out the analysis of animal bones from archaeological sites is to learn about the relationships between humans and animals in the past. Such study is particularly important at an urban site like Harappa where the population probably depended upon domestic animals for traction (plowing, pulling carts, carrying people and goods) and other secondary products (such as wool, hair, and milk), as well as for meat and hide. In addition, it was clear after the analysis of a small collection excavated from AB-mound during the 1986 season at Harappa that wild animals including deer, blackbuck and gazelle, fish, turtles, and birds were important to at least part of the population during the period of the Indus Civilization. This unexpected finding required confirmation from other parts of the site since the use of different animals for food could have varied through the ancient city according to what sections of the population had access to different kinds of animal resources. Furthermore, with the discovery of the extensive Early Harappan deposits in the area of E Mound, the question arose as to whether the nature of the exploitation of animals changed during the period that saw the development of the Harappan urban complex.

Study of the animal bones from different parts of Harappa site has begun to provide insights into these areas of enquiry. During the 1989 season, all previously excavated faunal materials were cleaned as a necessary preliminary to analysis. In addition, a number of lots from E Mound were examined and documented, and other materials from that area were selected for future study. During the 1990 season, vast amounts of faunal materials were excavated from the southern side of E Mound in street, occupational, and trash deposits. A large proportion of the remains from a north-south street was analyzed in the field and material from complementary loci was selected for future analysis. Even without final tabulations, it is already clear that the nature of the faunal remains varied considerably depending upon the intensity of occupation in the area. During periods of apparent abandonment or diminished use, the remains of whole animals or large parts thereof were dumped in the area while during periods of intensive use, material was highly fragmented and dominated by both smaller bones and the bones of smaller animals. Furthermore, the high proportion of bones from wild ungulate taxa noted in the 1986 sample was not duplicated, but large numbers of fish bones were recovered both through dry screening and water sieving. These findings have important implications for the interpretation of animal exploitation practices at Harappa in particular and at urban sites in general. They once again underline the need to carefully collect large samples from a wide variety of deposits.

In addition to the questions noted above, the analysis by George Dales of the figurines from Harappa has posed interesting problems. Water buffalo and non-humped cattle figurines are very common, yet there is little evidence so far for these forms in the animal bones. A problem faces the person who analyzes animal bones, however, and that is the difficulty of distinguishing between many of the skeletal parts of water buffalo and cattle and of humped cattle and non-humped cattle. With this in mind, a major effort was made during both seasons to make a collection of bones of modern animals and especially cattle and water buffalo from the "bonepits" outside of Harappa town. Specimens from nearly 75 animals were collected and prepared by simmering in laundry detergent, including the bones of water buffalo, zebu cattle, horse, donkey, mule, dog, and fish. Comparative osteological analyses are currently underway to define osteological differences between morphologically similar taxa. A complete collection of these modern specimens is stored at Harappa in order to

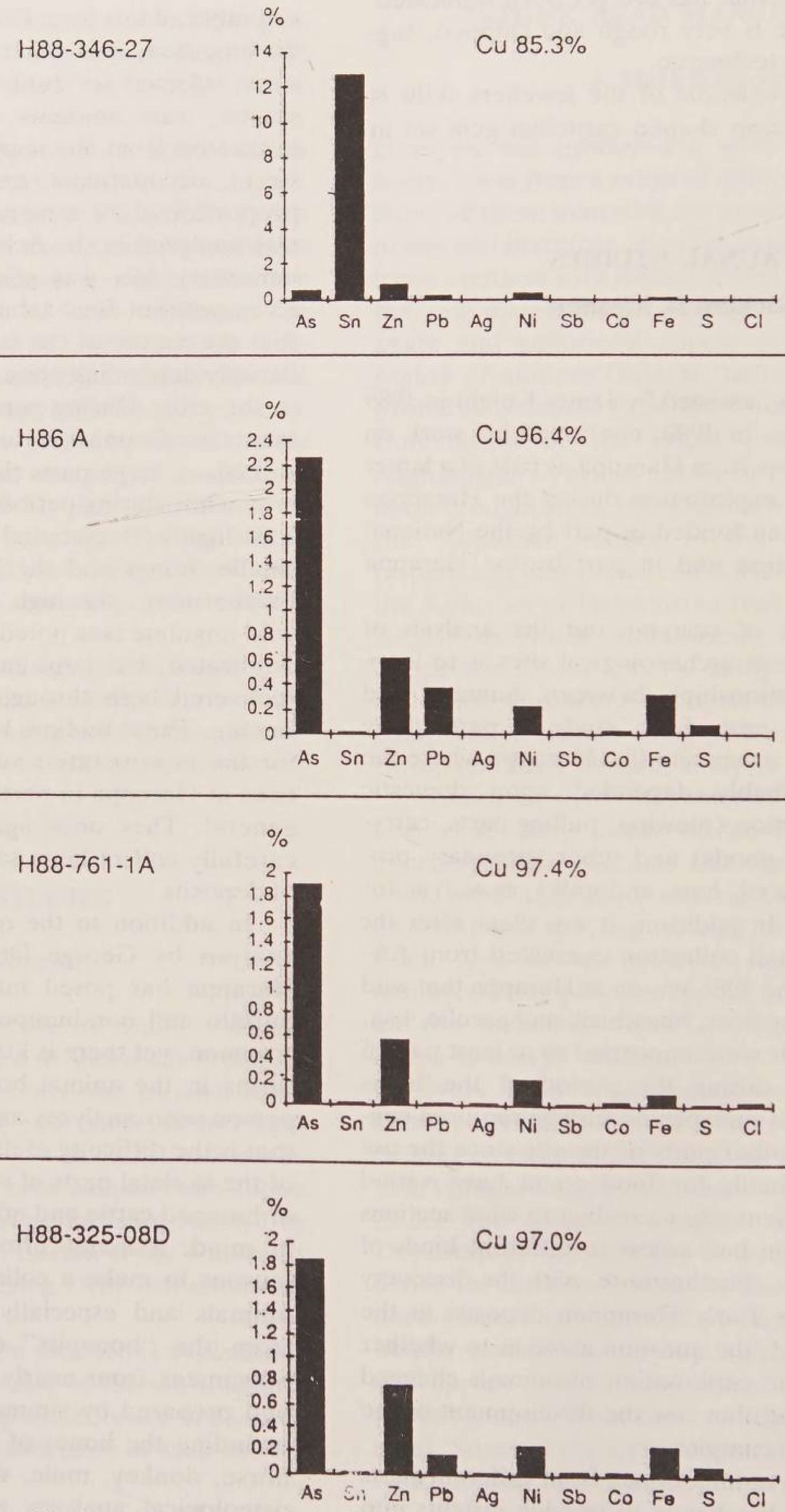


Fig. 40.23. Metallurgical analyses of four copper/bronze samples.

assist future researchers who wish to study the animal bones from archaeological sites in Pakistan.

Palaeobotanical Studies

The palaeobotanical samples collected from the 1989 excavations on Mound E contain a large percentage of carbonized seeds. These samples were collected in the field using flotation and then taken to Madison for cleaning and analysis. The remains are currently under analysis by Heather Miller and Seetha Reddy of University of Wisconsin. Dr. Steven Weber, University of Pennsylvania, has assisted with the identification of specific seeds. To date they have identified a wide range of plants spanning the Early Harappan and the Harappan periods.

The preliminary analysis of the 1989 samples identifies primarily winter grain crops of wheat and barley, together with a fine collection of legumes (Lens and a variety of the Lathyrus/Pisum/Cicer types). In addition, the samples contain a good array of wild seeds, including many "weedy" types. There are the seeds of various small wild grasses, Amaranthus/Chenopodium types, *Trianthema triguetra* and *Digera muricata,* as well as some *Zizyphus* sp. and *Albizia procesa/lebbeck*.

SOIL SURVEY

Elise Pendall and Ronald Amundson

INTRODUCTION

During the 1987 and 1988 field seasons, Dr. Ronald Amundson and Ms. Elise Pendall of the University of California, Berkeley conducted soil studies to assess the pre-settlement environmental setting and to investigate the fluvial history of the Ravi River around the archaeological site (Pendall and Amundson 1990). Samples of natural as well as archaeological sediments were collected for chemical analysis. Laboratory analyses were conducted to determine particle size, organic and inorganic carbon, major anions and cations, phosphorus, ph, alkalinity, and electrical conductivity. Further analyses were performed on the stable isotope chemistry and the morphology of calcium carbonate nodules found in the natural soil in the cemetery area (Pendall and Amundson 1990).

A soil survey of an eight square kilometer area around the mound of Harappa was conducted by augering 1.5 to 3 meter deep soil cores on north-south and east-west transects (Fig. 40.22). These borings, placed at internals of 150 to 200 meters, were described in the field and samples were collected for further analyses. Series names were given to the soils, but it should be noted that while some series names correspond to established soil series used by the Pakistan Soil Survey (e.g. Qadirabad), in other cases, new series names were given on the basis of local geomorphic features. A soil map was prepared using a topographic map of 1:50,000 scale as a base (Fig. 40.22).

At Harappa, most sediments associated with human occupation are silt loam to very fine sandy loam in texture. Within cultural strata, debris layers have sometimes been sorted by running water, and contain coarse (sand and gravel sized) particles of broken pottery and bricks. Cultural layers are dominated by silt loam textures, although silty clay loam textures can be found in some mud bricks.

At a distance of 0.5 to 1 kilometer outward from the edge of the mound, debris from Period III cover the natural soil surface to varying depths. This material may be associated with or buried by subrecent alluvium or may have gypsum accumulation within the profile. The surface is extremely salty and has sparse halophytic vegetation growing on it except where the surface debris have been scraped and the land reclaimed for agriculture. The presence of coarse rubble and other Period III debris at depths to three meters, as far as half kilometer from the site, may indicate locations of infilled borrow pits or rapid accretion of alluvium.

Recent Soils

The survey of the natural soil surrounding Harappa shows a dynamic and youthful environment because the meandering of the Ravi River has caused aggradation of the floodplain. The youngest geomorphic surface in the area is the lowest channel north of Harappa city and mound. Flooding, possibly as recent as 20 years ago, has cut into banks creating terraces around the recent stream channel. Soils of the recent channel are composed of silty clay loam to sandy loam to sand, and may have a slight accumulation of organized matter in a surfacial plowed horizon. This soil represents time equals zero in the chronosequence since it is minimally developed.

Subrecent Soils

The next oldest geomorphic unit is loosely termed "Subrecent". The age of subrecent soils is difficult to establish since no datable materials were recovered. However, judging from relative soil development we place this unit between 500 and less than 7000 years in age. It is found mainly north and east of the mound, as well as in a band to the south. This unit consists of floodplain and channel deposits and levee remnants. The soils exhibit varying degrees of development, depending on age and facies. In most soils, incipient calcite or gypsum accumulation is evident, and agricultural soils have surfacial darkening from organic matter accumulation.

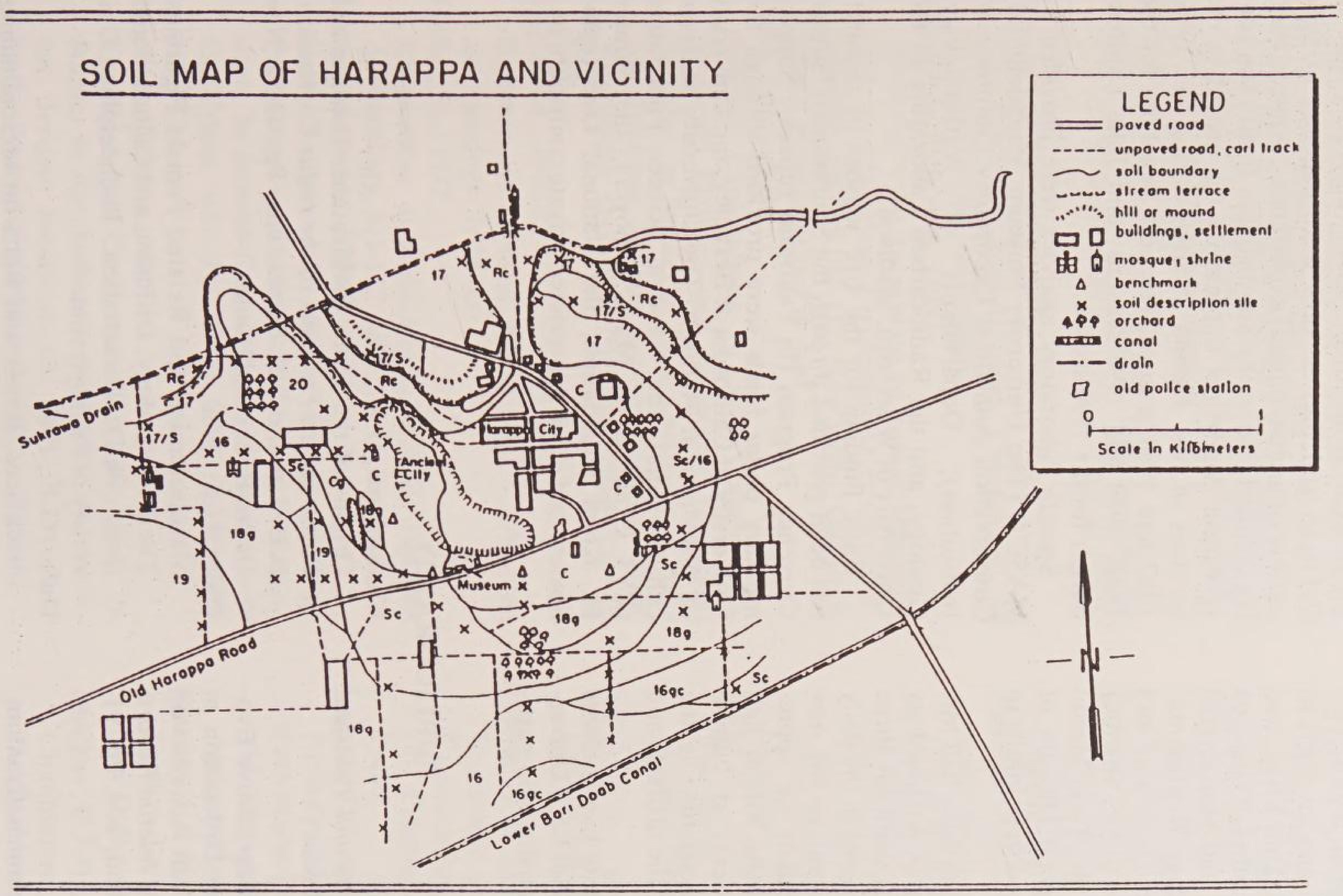
Late Pleistocene Soils

The oldest surface is late Pleistocene in age (Dr. Alim Mian, pers. comm., 1987), and was deposited by the Ravi River when rapid glacial melting and erosion of foothill soils was taking place. Soil formed in this deposit is relatively well developed. Its most noticeable feature is the presence of large and dense calcite nodules (kankar), which have formed over time by the downward movement of carbonates. The radiocarbon age of the single sample so far tested, of inner portions of these calcite nodules (5969 cal. B.C.) indicates that the soil reflects environmental conditions which existed prior to Period III occupation. A zone of clay accumulation may be present, but organic matter accumulation and intensive bioturbation are evident in the surface. This soil is found south and west of the mound area, and as remnant "islands" near the recent channel to the north and on the edge of the mound in the cemetery area.

CONSERVATION

The conservation laboratory at Harappa has proven to be of major importance in the treatment and preservation of artifacts as they come from the excavations. The laboratory was initially set up by Donna Strahan of the Smithsonian's Conservation Analytical Laboratory (CAL). She was assisted during the second season by Margaret Leveque of the Museum of Fine Art, Boston. Currently the laboratory is supervised by Harriet F. Beaubien of CAL. Additional assistance has been provided by Mr. Toseef-ul Hasan of the Department of Archaeology's laboratory, Lahore Fort; Mr. Wassem Ahmed, Senior Chemist at the Lahore Museum; Mrs. Barbara Dales and Ms. Dawn Morton, and during the 1990 season by Julie Lauffenburger of CAL.

Due to the high salinity in the soil, the rapid crystallization of salts and the fragile nature of many artifacts, it has proven essential to have full-time conservators at the site. Bone objects, metal objects, fabric impressions, seals, and pottery vessels and specific sherds with important painted motifs or surface treatments are either treated while still in the ground or are taken directly to the conservation laboratory for treatment. All the conclusion of treatment and consolidation, the objects can be safely handled or stored for further study, or prepared for museum display.



SOIL MAP OF HARAPPA AND VICINITY
LEGEND
paved road
unpaved road, cart track
soil boundary
stream terrace
hill or mound
buildings, settlement
mosque; shrine
benchmark
soil description site
orchard
canal
drain
old police station
0
1
Scale in Kilometers
N
Sukrawa Drain
Old Harappa Road
Lower Bari Doab Canal
Harappa City
Ancient City
Museum
Rc
17
17/S
16
20
Sc
Cg
C
18g
19
Sc/16
16gc

Soil map of the region around Harappa. Mapping units are described in text. Abbreviations for mapping units are: C Cg: Cultural material; Cultural material with gypsum. Rc: Recent Channel. Sc: Subrecent Channel. 16; 16gc: Sultanpur; Sultanpur, gypsum plus calcite phase. 17; 17/S: Sultanpur Levee Remnant Complex; Sultanpur Levee Remnant Complex, shallow over sand. 18g: Gamber. 19: Lyallpur. 20: Qadirabad.

Fig. 40.24. Soils map of Harappa area.

ACKNOWLEDGEMENTS

Appreciation is extended to the Department of Archaeology, Government of Pakistan, it's Director -General, Dr. Ahmed Nabi Khan and his staff; to Mr. Mohammad Siddique, Mr. Makhin Khan, and Mr. Bahadar Khan, successive Curators of Harappa Museum; and to Qasim ul-Qasmi and Mohammad Khalid, Department of Archaeology Representatives, all of whom generously offered assistance and support. Thanks are also extended to Mr. Shahbaz Khan, Mr. Waseem Ahmed, and Mr. Tariq Masud of Lahore Museum, and Dr. Javaid Hussain of Karachi University who participated so helpfully in the field.

We appreciate the opportunity to have had Mr. Tofeef ul-Hasan of the Department of Archaeology Conservation Laboratory (Lahore) work for three seasons in our field laboratory, to assist in the daily work and to acquire training in some of the new conservation techniques. And equally we appreciate the valuable assistance of Miss Rifa'at Saif Dar and Shokat Ali Shad, students at Punjab University, who filled in at a crucial time in the 1990 season to do the drawings of the artifacts and pottery.

And we wish to thank the twenty-five students from Karachi University, Shah Abdul Latif University (Khairpur), and Punjab University who participated in our field training sessions. We learned a great deal from them about university life in Pakistan and they in turn were exposed to wide variety of archaeological experiences. Appreciation is extended also to the Smithsonian Institution conservation Analytical Laboratory for providing the services of Ms. Donna Strahan during the 1986, 1987 and 1988 seasons; Harriett Beaubien for the 1988, 1989 and 1990 seasons; and Julie Lauffenburger for the 1990 season.

Specific laboratory analyses were provided by MASCA (The University Museum, Philadelphia); Conservation Analytical Laboratory (Smithsonian Institution); Departments of Anthropology, Geology, and the Radiocarbon Laboratory of the University of Wisconsin, Madison.

Basic funding for the five seasons of research has been provided through the Smithsonian Foreign Currency Program (in Pakistani rupees). Supplementary dollar funds were provided through the University of California at Berkeley, the University of Wisconsin at Madison, The University Museum (Philadelphia), the National Science Foundation (PVI Grant to J. Mark Kenoyer), the Samuel H. Kress Foundation, the National Geographic Society and much appreciated private contributions.

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BRIDGET ALLCHIN AND RAYMOND ALLCHIN

41. Lewan—A Stone Tool Factory of the Fourth to Third Millennium B.C.

INTRODUCTION

THE site of Lewan was discovered by Professor Farid Khan, of the University of Peshawar, when he was making a survey of ancient sites in the Bannu Basin in the early 1970s. He recognized its unusual character, and showed it to us in 1977. When we were beginning an interdisciplinary survey of the Bannu Basin in collaboration with the Department of Archaeology of Peshawar University, and with him and Professor Durani we undertook the investigation of the site. The survey and the Lewan excavation were both part of the first project of the newly formed Cambridge Archaeological Mission to Pakistan, (which later became the British Archaeological Mission to Pakistan). When negotiations were going forward with the owners of the land, who lived in the nearby village of Zabta Khan Drei Dariz, insisted that we should use their family name, Lewan, meaning "wolves", for the site rather than of the village.

Lewan is in the Bannu Basin, in the Northwest Frontier Province of Pakistan (Fig. 41.1). Lying on the edge of the Indus Plains, divided from them by a low range of hills, it has something of the character of a transition zone between the plains and the mountains, but it is also emphatically a distinct geographical entity in its own right. One of the ancient routes from the Indus to eastern Afghanistan and Iran starts from Bannu, and runs up the Kurram River valley into the northwestern mountains (Fig. 41.2). Bannu District has been tribal territory, largely outside government jurisdiction, since British times and is gradually being integrated administratively into Pakistan. The British Archaeological Mission was the first outside group permitted to work there.

The investigation of Lewan was part of an interdisciplinary survey of the Basin as a whole (Allchin, Allchin, Durrani and Khan, 1986, hereafter referred to as *Lewan*, 1986), following the earlier survey of ancient sites made by Farid Khan. Parts of the region are rich in settlement sites, ranging from early historic times back, as we now know, to the early fourth millennium B.C. (Khan, Knox and Thomas, 1988). Among them Lewan stands out as a site with a charactar markedly different from the rest. It is first and foremost a place where stone artefacts of many different kinds were produced in large quantities, and where such evidence as there is of actual occupation appears subordinated to the vast quantities of stone tools and debris from their manufacture that lie on the surface of the site (Pl. 41.1). This impression, as it turned out, was somewhat heightened by the degree to which the site has been subject to deflation (i.e. the removal of all finer particles from the upper layers by wind and water, so that heavier materials such as stone and pottery drop down and accumulate on the surface), but it was to a considerable extent confirmed by our investigations.

At the time of the Bannu survey and the excavation of Lewan (1977/78) the whole picture of the development of culture and early urbanism in the Greater Indus region was not so clearly understood and defined as it is today. Now we have a clearer

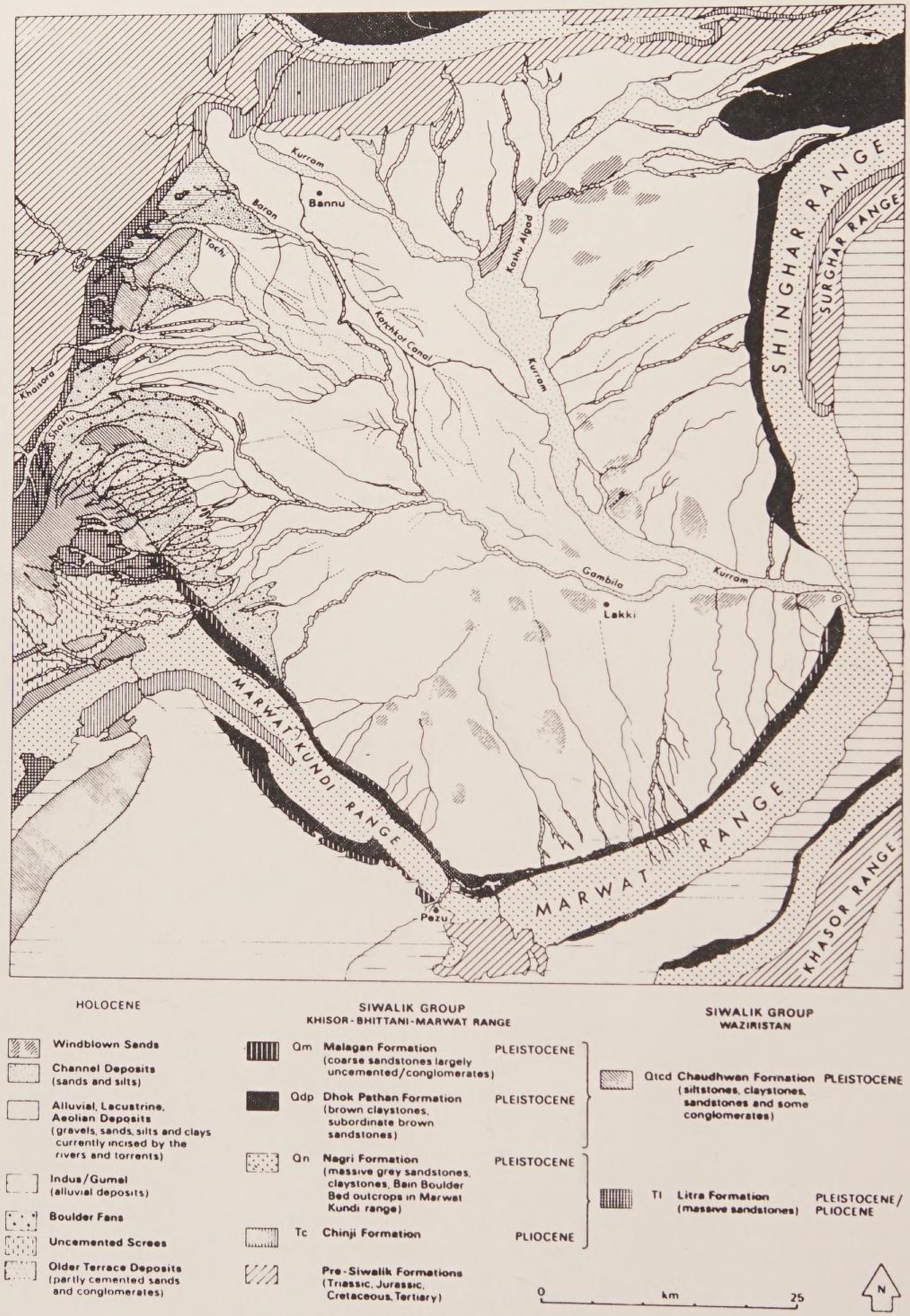
Kurram
Bannu
Baran
Tochi
Kachkot Canal
Kashu Algad
Kurram
Khaisora
Shaktu
Gambila
Kurram
Lakki
SHINGHAR RANGE
SURGHAR RANGE
MARWAT KUNDI RANGE
MARWAT RANGE
KHASOR RANGE
Pezu
HOLOCENE
Windblown Sands
Channel Deposits (sands and silts)
Alluvial, Lacustrine, Aeolian Deposits (gravels, sands, silts and clays currently incised by the rivers and torrents)
Indus/Gumal (alluvial deposits)
Boulder Fans
Uncemented Screes
Older Terrace Deposits (partly cemented sands and conglomerates)
SIWALIK GROUP
KHISOR-BHITTANI-MARWAT RANGE
Qm Malagan Formation (coarse sandstones largely uncemented/conglomerates) PLEISTOCENE
Qdp Dhok Pathan Formation (brown claystones, subordinate brown sandstones) PLEISTOCENE
Qn Nagri Formation (massive grey sandstones, claystones, Bain Boulder Bed outcrops in Marwat Kundi range) PLEISTOCENE
Tc Chinji Formation PLIOCENE
Pre-Siwalik Formations (Triassic, Jurassic, Cretaceous, Tertiary)
SIWALIK GROUP
WAZIRISTAN
Qtcd Chaudhwan Formation (siltstones, claystones, sandstones and some conglomerates) PLEISTOCENE
Tl Litra Formation (massive sandstones) PLEISTOCENE/PLIOCENE
0
km
25
N

Fig. 41.3. Geology of the Bannu Basin (Courtesy H. Rendell)

and the other in July and August due to the summer monsoon.

The rivers and local torrents have combined to fill the basin formed by the Siwalik ridge with silts and gravels, augmented by blown sand, to an estimated depth of 900 m. The effect of the Siwalik ridge is emphasized by the level of the floor of the Gomal basin immediately to the south, which has no such ridge, and is 104 m below that of the Bannu Basin. Today the Kurram finds its way out through a narrow breach in the ridge, known as the Kurram Gap. Such geological and geomorphological observations as it was possible to make in the course of our brief survey, supported by a limited amount of earlier work and some historical references, indicate that for considerable periods in the past there were lakes and marshes in the southeastern parts of the basin, suggesting that the breach may be of quite recent origin. A number of species of migrant birds, including cranes, which normally live in marshy environments, regularly land in the Basin on their way from Siberia to destinations in India and beyond.

The climate of the Bannu Basin is in many respects the same as that of southern Punjab and northern Sind: it is arid, with an irregular rainfall. The mean annual rainfall is a little over 300 mm, varying somewhat within the Basin. But lying in the transition zone between the winter rainfall zone which predominates in the mountains to the northwest, and the summer monsoon rainfall system, which prevails to the south, it may, in any particular year, get the worst or the best of either pattern, or of neither or both. Therefore the amount of rainfall varies greatly from year to year. Being to some extent in an enclave of the mountains, where two rivers meet before entering the plains, the basin is rather more subject than are the adjacent plains to the effects of the winter rainfall zone to the north, both directly in terms of rainfall, and indirectly in terms of water, and sometimes floods, carried by the main rivers in the winter months.

There is considerable diversity of environment within the Basin, due to the variation in average rainfall in different parts, as mentioned above, and to other factors. In general the south and southwest parts are the most arid, with a certain amount of moving sand and small dunes. The north and northeast are very much affected by seasonal torrents which constantly shift their courses and carry away the soil, some of which is redeposited elsewhere. The northwest sector where the main perennial rivers enter, appears to be the most stable and productive today, and it is here that the majority of settlements, both ancient and modern are located, served by irrigation systems that are probably, in part at least, of considerable antiquity. Lewan is in this part of the Basin.

There is some evidence from the Bannu region itself, in addition to that from the Indus region as a whole, that there have been relatively small but significant fluctuations of climate during and since the long period of development, maturity and decline of the Indus Culture. But it seems probable that the internal environmental pattern of the Bannu Basin remained constant while subject as a whole to general climatic fluctuations.

Today virtually all cultivatable land on the floor of the Basin is in use, and cattle, goats and other livestock graze on the surrounding hills. Trees on all accessible slopes are cut for timber and firewood, and wild life is reduced by hunting and by the competition of grazing animals.

Everywhere the effects of human activities are evident. All the indications are that this process has been intensifying since the time of the earliest settlements in the region, and perhaps before, no doubt with periods of acceleration and others of intermission or even reversal. At present we do not know accurately to what extent the rate of change has varied from one period to another. However some clear general indications have been obtained from the archaeological record and other sources, and it is to be hoped that a more complete picture will be built up in course of time. There can be little doubt that given generally similar climatic condition to those of today, prior to the build up of the human population the Bannu Basin as a whole must have presented a greener and more wooded appearance than it does now. The crops, domestic animals and general subsistence patterns of the present day are generally similar to other parts of the western border lands, need not be discussed here. (For a fuller account of the environment see papers by H. Rendell and K.D. Thomas, in *Lewan* 1986.)

The Site of Lewan

The site consists of a fragment of a degraded river terrace measuring approximately 450 by 325 m, and probably originally associated with the river Tochi, which has since shifted its course (Fig. 41.4). When we carried out the survey and excavations the surface of the site was covered with large river pebbles and cobbles of varying sizes, all with a heavy dark brown desert varnish, interspersed with pot sherds, large quantities of microliths mainly made of reddish chert, debitage from their manufacture, and other small occupation debris.

On examination many of the varnished pebbles and cobbles were seen to have been broken prior to acquiring the desert varnish (Pl. 41.2). Furthermore they were found to include many artefacts such as axes, hammers, sling stones, pestles, grinding stones of various kinds, saddle querns, ringstones and others not immediately classifiable. A few were complete, and some appeared to have been used, but the majority were broken, and many appeared to have been abandoned before completion. There were also a great many stones that appeared to have been deliberately broken, worked fragments and debitage of all kinds, all of which had subsequently become varnished. The extent and intensity of varnish on individual pieces varied, as it always does, according to its position, and the extent to which it had been sheltered by other stones. The underside in some cases was only lightly varnished for the same reason, but in others the varnish was fairly even, presumably because some pieces had been regularly turned over by the feet of people or animals walking across the site as they do today.

The pebbles that had been worked and subsequently weathered in this way appeared to be mainly of meta-igneous rock, and subsequent sampling showed that over 61 percent of the pebbles on the surface of the mound were indeed of meta-igneous material. Similar pebbles on an adjacent terrace fragment had the same desert varnish, but only a small proportion had been broken or worked, and sampling showed that 397 percent as opposed to 61 percent were of meta-igneous material. Microlithic artifacts and potsherds were also markedly less numerous. These observations clearly indicated that Lewan was a factory site where heavy stone artifacts were made, largely from pebbles of igneous and other kinds of rock. The high proportion of meta-igneous rock also suggests that pebbles and cobbles of this material were brought to the site from elsewhere. There are indications that certain other types of rock particularly suitable for making beads or microliths were also imported as will be shown below.

Desert varnish is due to a combination of exposure and bombardment by wind-borne sand grains over a considerable period of time (the length of time involved being a matter of controversy). Therefore the heavy desert varnish on a high proportion of the larger stones covering much the site must indicate a period of abandonment, and probably increased aridity, since the site was occupied or used. In present conditions it is difficult to identify the source of the blown sand, as the Tochi River flows to the west of the site, effectively cutting it off from the moving sand in the southwestern sector of the basin which might otherwise reach it with the prevailing southwesterly wind. Therefore it appears that not only must there have been a period of somewhat more arid conditions than those of today, but that the Tochi River must have flowed to the east of the site for a time. A possible alternative is that for a time sand deposited by the river was blown up from its bed during the dry season.

The microlithic material also consisted largely of broken and unfinished artefacts and debitage almost entirely made of chert and jasper which, in contrast to much of the rock used to make the larger tools, does not take on a desert varnish. It does however, in certain circumstances, take on a polish and loose its sharp outlines due to sand bombardment. Rocks of this kind break with a smooth concoidal fracture. As a result the debitage, etc. at Lewan is mostly in the form of relatively small pieces, many of them thin flakes, which tend to lie flat on the surface. therefore, although somewhat weathered and sandblasted, it appears to have been sheltered from the onslaught of sand grains by the larger pebbles, etc., and to show only limited evidence of weathering. The potsherds too were comminuted and often heavily weathered.

Beneath the stones and other debris an old degraded surface was found on the central parts of the mound, on which the outlines of huts and pits were visible in places (Pl. 41.3). The level of the central and upper parts of the mound proved to have been considerably reduced by deflation (removal of all finer particles by the agency of wind and water) which in many cases had removed all but the last traces of huts, rubbish pits etc., and had caused the

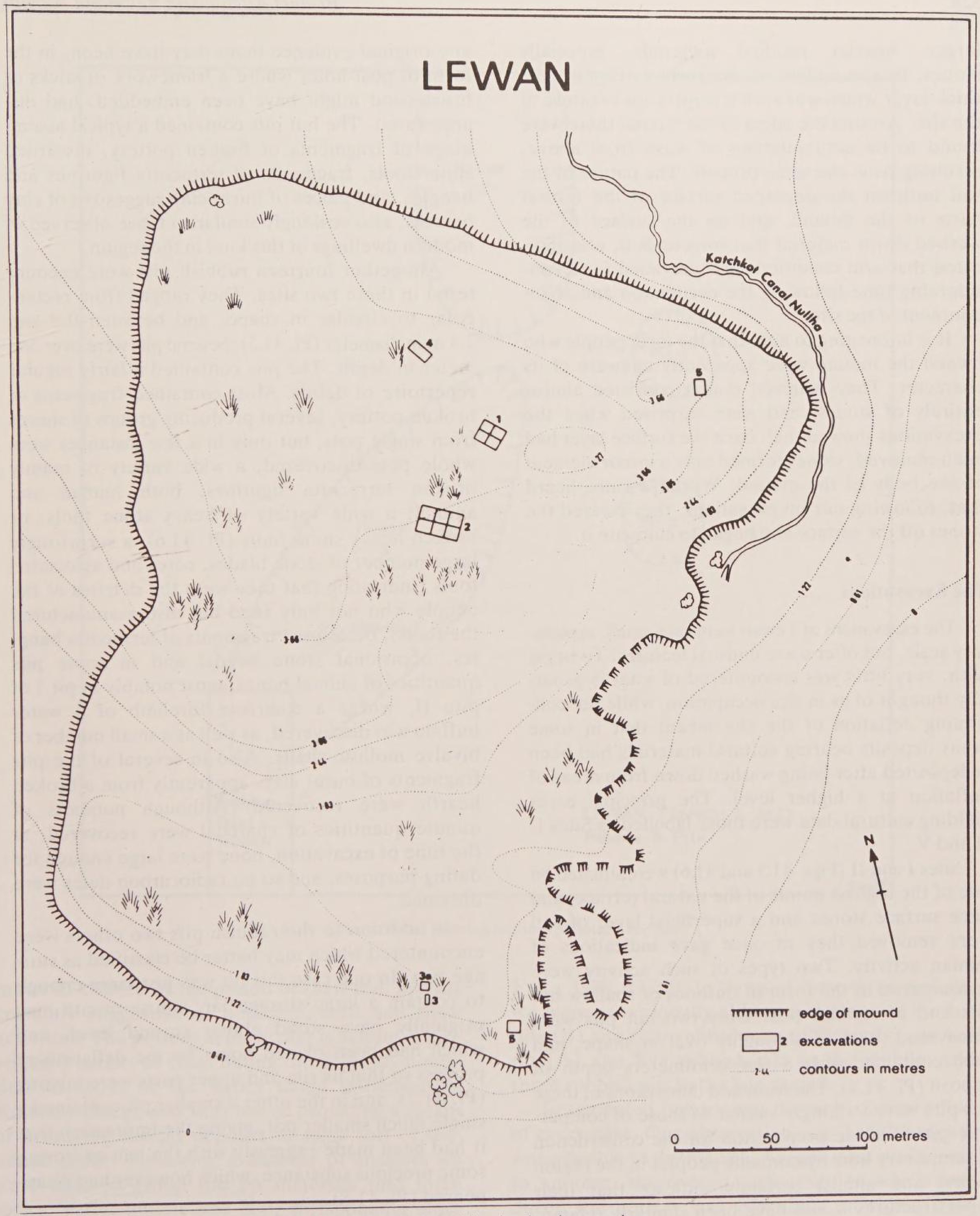
LEWAN
Katchkol Canal Nullha
1
2
3
3a
4
5
6
N
edge of mound
2 excavations
2·44 contours in metres
0
50
100 metres

Fig. 41.4. Lewan: plan of the site showing trenches.

larger, heavier residual materials, especially stones, to accumulate on the surface, forming the thick layer which was such a conspicuous feature of the site. Around the edges of the mound there were found to be accumulations of wash from above, resulting from the same process. The nature of the soil both on the degraded surface of the central parts of the mound, and on the surface of the washed down material that surrounds it, also indicated that arid conditions had prevailed for a considerable time following the occupation and abandonment of the site.

It is interesting to note that the local people who owned the mound were apparently unaware of its character. They believed that it consisted almost entirely of stones, and were surprised when the excavations showed that, once the surface layer had been removed, stones formed only a minor element of the body of the mound. We have since heard that, following our investigations, they cleared the stones off the surface and began to cultivate it.

The Excavations

The excavations at Lewan were on a small, exploratory scale, but offer some unusual features. To begin with, very little was encountered of what is generally thought of as in situ occupation, while the continuing deflation of the site meant that in some areas deposits bearing cultural materials had been redeposited after being washed down from areas of deflation at a higher level. The principal areas yielding cultural data were those labelled as Sites I, II and V.

Sites I and II (Figs. 41.5 and 41.6) were situated on one of the highest points of the natural terrace, and once surface stones and a superficial layer of soil were removed they at once gave indications of human activity. Two types of such activity were encountered in the form of outlines of shallow hut pits and of rubbish pits. Only two hut pits were discovered, each was roughly oval in shape, and each contained only a few centimeters depth of deposit (Pl. 41.4). The form and dimensions of these hut pits were strikingly similar to those of comparable pits made in preparation for the construction of temporary huts by nomadic peoples in the region today, and almost certainly indicate that their superstructures would have been similarly related. However, the deflation of the surface meant that any original evidence there may have been, in the form of post-holes where a framework of sticks or brushwood might have been embedded, had disapppeared. The hut pits contained a typical assemblage of fragments of broken pottery, discarded stone tools, fragments of terracotta figurines and bangles, and pieces of burnt clay suggestive of clay hearths, also strikingly similar to those observed in modern dwellings of this kind in the region.

Altogether fourteen rubbish pits were encountered in these two sites. They ranged from rectangular to circular in shape, and between 0.9 and 2.4 m in diameter (Pl. 41.5). Several pits were over one meter in depth. The pits contained a fairly regular repertoire of debris. Most contained fragments of broken pottery, several producing groups of sherds from single pots, but only in a few instances were whole pots discovered; a wide variety of mainly broken terracotta figurines, both human and animal; a wide variety of heavy stone tools, or broken heavy stone tools (Pl. 41.6); a surprisingly large number of stone blades, cores and associated tools (indicating that they were the detritus of the people who not only used but also manufactured the tools); occasional fragments of terracotta bangles; occasional stone beads; and in some pits quantities of animal bones, most notably in pit 1 of pite II, where a complete forelimb of a water buffalo was discovered, as well as a small number of bivalve mollusc shells. Also in several of the pits fragments of burnt clay, apparently from a broken hearth were recovered. Although numbers of minute quantities of charcoal were recovered, at the time of excavation, none were large enough for dating purposes, and so no radiocarbon dates were obtained.

In addition to the rubbish pits two others were encountered which may better be classified as storage pits. In one case this pit was just large enough to contain a large storage jar, whose mouth may originally have stood above ground level, and which had been planed down by the deflationary process so that its rim and upper parts were missing (Pl. 41.7); and in the other a smaller pit contained a single much smaller pot, giving the impression that it had been made expressly with the aim of storing some precious substance, which however had disappeared (Pl. 41.8).

The contents of the pits and of the hut pits thus appear to provide a reasonable cross section of the

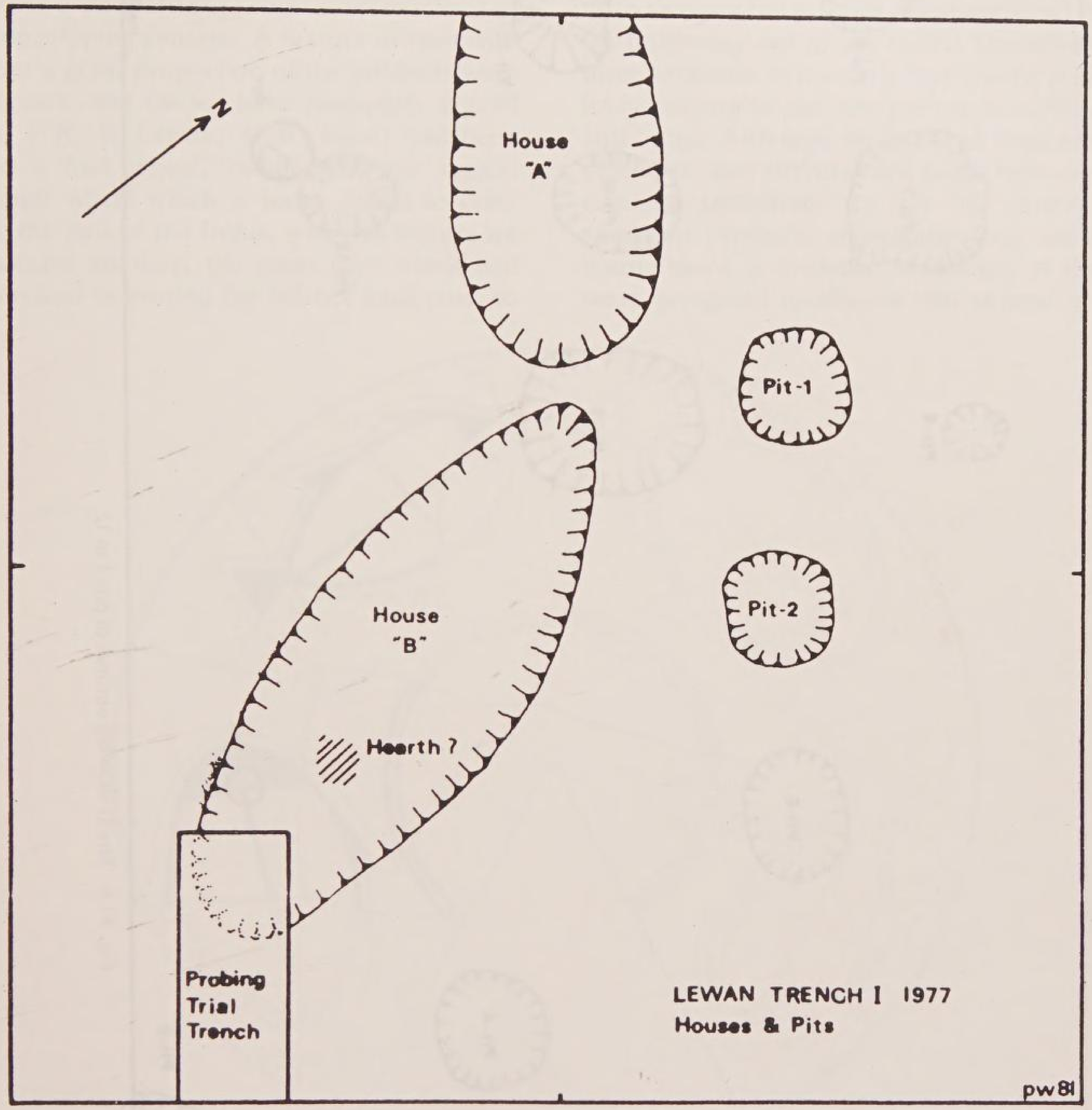

Fig. 41.5. Lewan: Site I showing outlines of houses and pits.

material culture of the period of their use, and are certainly suggestive of domestic, craft and ritual activities. The pottery in particular is helpful in providing a means of cross dating the deposits in relation to those of the better dated settlement of Rehman Dheri, and thus too of providing a means of arranging the pit deposits in some sort of sequence order. Following a number of analyses we were able to group the pit materials into three series, early, middle and late, corrsponding more or less with Rehman Dheri I (3350-2850 B.C.), II (1850-2500 B.C.), and III (2500-1900 B.C.) (Durrani, F.A., 1988, 27-30). In terms of these three periods, we were provisionally able to assign one of the hut pits (B) and four rubbish pits to the early; one hut pit (A) and five rubbish pits to the middle; and three rubbish pits to the late period.

Fragmented pottery was the most common find in every case. Our observation was that although it was possible to distinguish changes from one period to another, the overall craft tradition which produced the pottery was essentially unbroken from beginning to end of the occupation, and (as does the pottery tradition of Rehman Dheri, with which

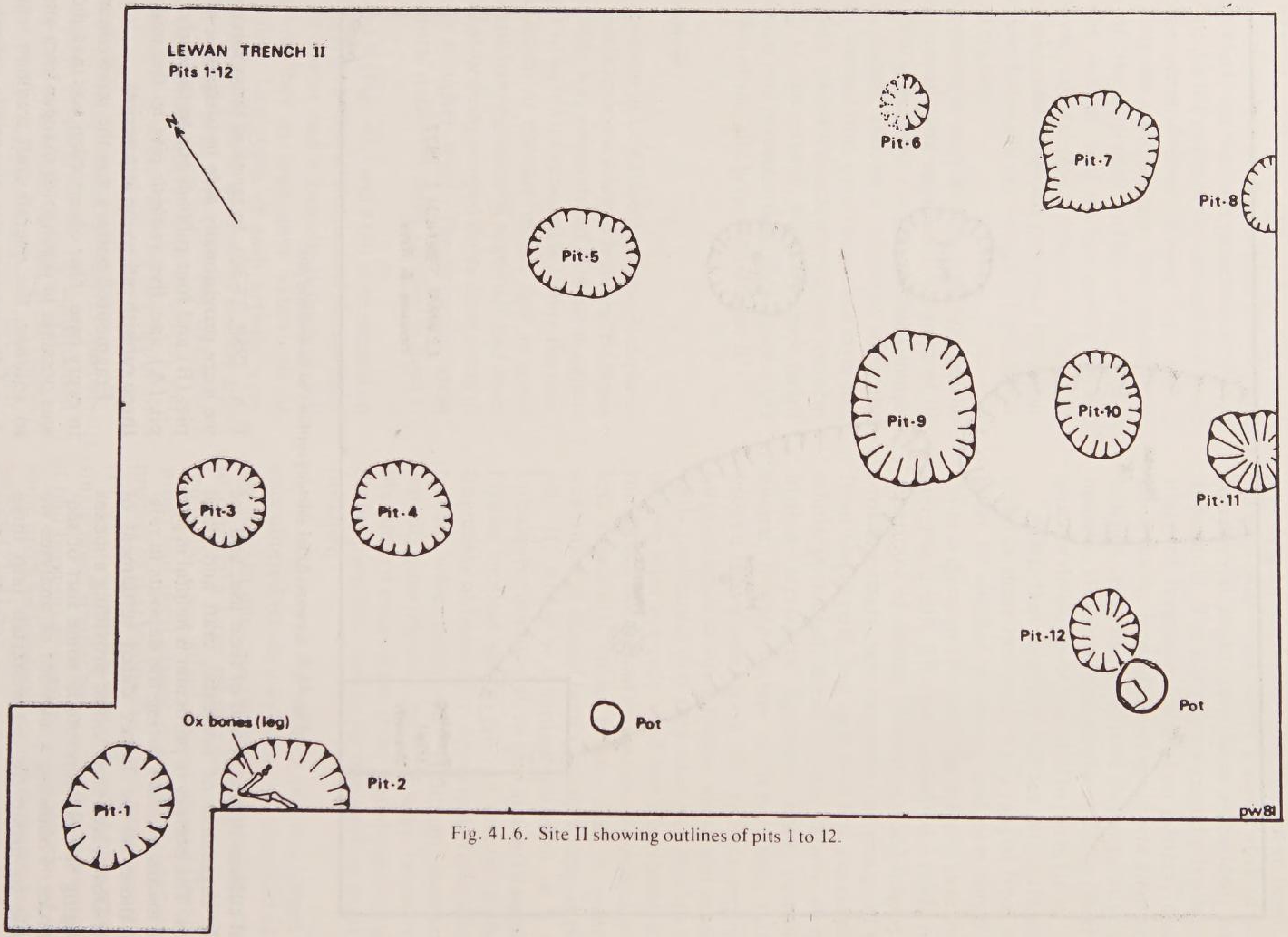
LEWAN TRENCH II
Pits 1-12
N
Pit-1
Ox bones (leg)
Pit-2
Pit-3
Pit-4
Pit-5
Pot
Pit-6
Pit-7
Pit-8
Pit-9
Pit-10
Pit-11
Pit-12
Pot
pw81

Fig. 41.6. Site II showing outlines of pits 1 to 12.

it bears such a close affinity) constitutes evidence of a single developing process. A feature of the tradition is that a great proportion of the products were wheel thrown, and (as we have previously argued (Allchin, F.R. in *Lewan*, 1986, 103-4) had been made on a foot wheel, rather than the typical Indian spun wheel which is today found so commonly to the east of the Indus. with this feature we may associate another, the great care which had been exercised in turning the leather hard pots, so as to sharpen the profiles of the walls and the graceful hollowing out of the bases. These features are more common in the early and middle periods, and less common in the late period, even though they still occur. Although we found no trace of any kilns at Lewan, and although one might have expected so small a settlement to rely for pottery on the specialist products of neighbouring, larger settlement, there is evidence that some of the vessels were produced locally, in that several of the pits

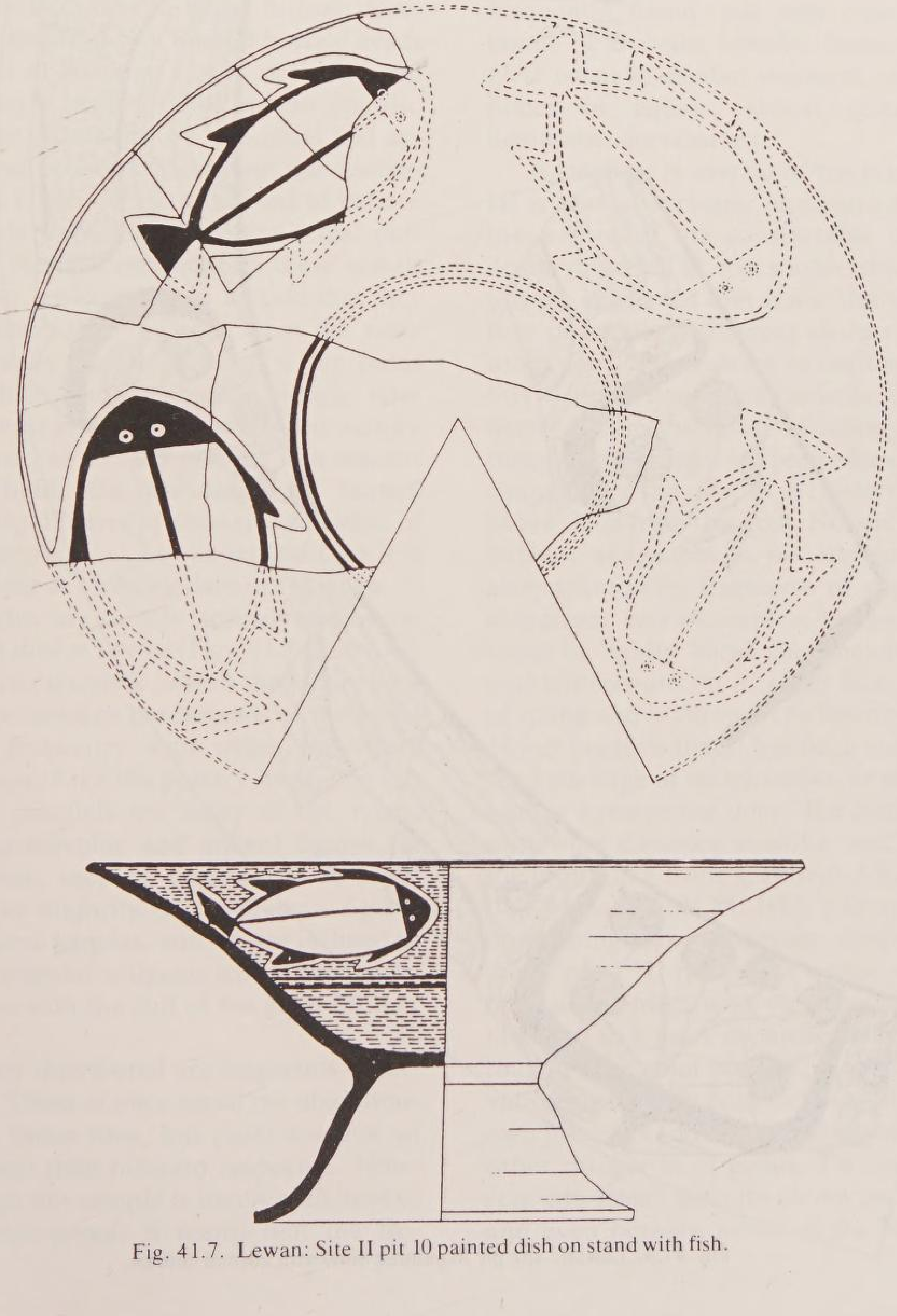

Fig. 41.7. Lewan: Site II pit 10 painted dish on stand with fish.

contained sherds of kiln wasters.

Among the finds from period I two painted vessels from pit 10 are particularly interesting. The first is a dish-on-stand whose interior was decorated with a zone of four fish (of which only two survive) painted in white and outlined in black against a red background (Fig. 41.7). Very similar fish form a regular decorative motif on bowls from period I at Rehman Dheri, and fish are similarly used as a decorative motif at a much later date in Mehrgarh (period VII). The second fragment comes from the same pit and thus belongs to the same period (Fig. 41.8). It is reconstructed as a bowl from a number of fragments, but the decoration on the external wall

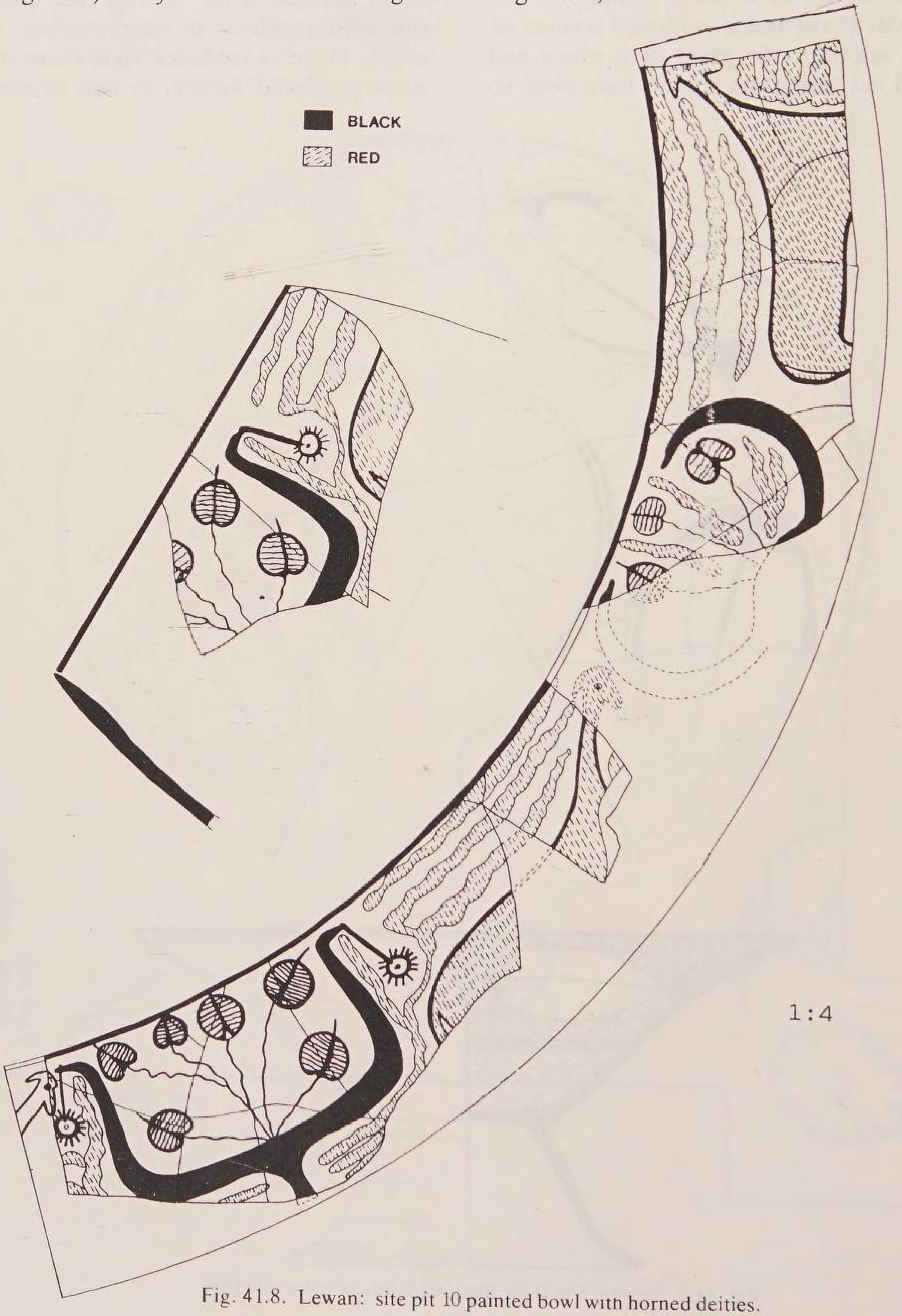

Fig. 41.8. Lewan: site pit 10 painted bowl with horned deities.

of the bowl is sadly incomplete. The whole appears to represent four animals: two hornless goats, reminiscent of the Indian breed of Jamuna pari, and two boucrania, the first representing the head and horns of a *Bos indicus*, having hanging pom-poms on the horn tips, and six pipal leaves emerging from the head between the horns, and the other (less complete) apparently representing the horns and probably head of a typical buffalo, with three pipal leaves similarly placed. All the animals are outlined in black on a white background, the goats and parts of the background being further decorated with wavy bands of red. Similar buffalo heads have been found at Rehman Dheri, periods I and II; and more rarely heads of *Bos indicus* are also found at that site. Furthermore, the pipal leaf appears as a decorative motif throughout the occupation of Rehman Dheri. We are inclined to believe that these vessels were used for some ritual purpose. Whatever the interpretation on these vessels may be at Lewan, at least it may be said that they clearly demonstrate that the site, from the early period, was already part of a much wider Indus province in which the symbolism which later becomes the interprovincial currency of the mature Indus civilization was already present in a nascent form. In this light, the association of horned boucrania and pipal leaves is strongly indicative of a religious connotation, at Lewan no less than it is at Kot Diji, or later at Mohenjodaro or Harappa.

The terracottas are widely spread among the different pits and sites at Lewan (Figs. 41.9 and 41.10). An interesting characteristic, which they share with other sites on the western borderlands of the Indus system, is the frequency with which they bore painted decoration. Like the pottery itself, one can find immediate parallels for many of the types, both of anthropomorphic and animal figures, at neighbouring sites, such as Gumla and Rehman Dheri. The great majority of the human figures appear to represent females, and we are inclined to regard them as popular religious icons manufactured in connection with the cult of the great Mother Goddess.

Equally widely distributed are fragments of terracotta bangles. These at once recall the ubiquitous finds at mature Indus sites, but point towards an earlier appearance than hitherto suspected. However, even though our sample is barely sufficient to provide conclusive proof, it seems that the frequency of occurrence is greater in contxts of the middle and late periods than in the early period. Only fourteen beads came from the excavations, the great majority of those found came from the surface. As we shall see below, surface collections in another part of the site indicated that there was a local bead manufacturing industry.

Although no plant remains were recovered from the excavations, there are sufficient animal bones to provide a reasonable sample (Fig. 41.11). Cattle bones predominate, with *Bos indicus* being most frequently found, but with a smaller number of bones of *Bubalus bubalis*. Bones of caprines and *Ovis* occur in smaller numbers, and there are two bones of equids, almost certainly of *Equus hemionus*, the semi-ass.

As well as in certain of the rubbish pits, Period III is also most clearly represented in site V, where the nature of the considerable depth of washed down material at the southeastern corner of the terrace suggested that it was derived from occupation of a rather different character to that of the other sites. The volume of the finely sorted soil in this deposit may even indicate that it had been derived from the decay of more permanent structures of mud brick or pressed earth. The distinct character of the deposit is reinforced by the nature of the finds from this area. Not only was the pottery entirely assignable to the late period, but it was accompanied by fragments of copper, lapis lazuli chippings, two incomplete terracotta carts, and a lump of lightly burnt clay, bearing two identical seal impressions on its outer face, and impressions of string and matting on its interior (Pl. 41.9). This object suggests that it had been used as a seal either for a package of merchandise, or more probably for sealing a storeroom door. The motif appears to be a somewhat distorted svastika, and strikingly recalls the motif on a stone seal from Altyn Depe, excavation 7 (Masson, V.M. 1981: p 68 and Pl.22, 1b). All these things taken together, convey an impression that Period III represents a time when Lewan was in closer contact with the outside world, and was involved in a more sophisticated trade relationship than in the earlier periods, as revealed by our excavations, probably both in terms of the export of its own products and the importing of raw materials or other categories of goods. This impression is entirely consistent with its dating partly to the Early, and even perhaps partly to the Mature Harappan

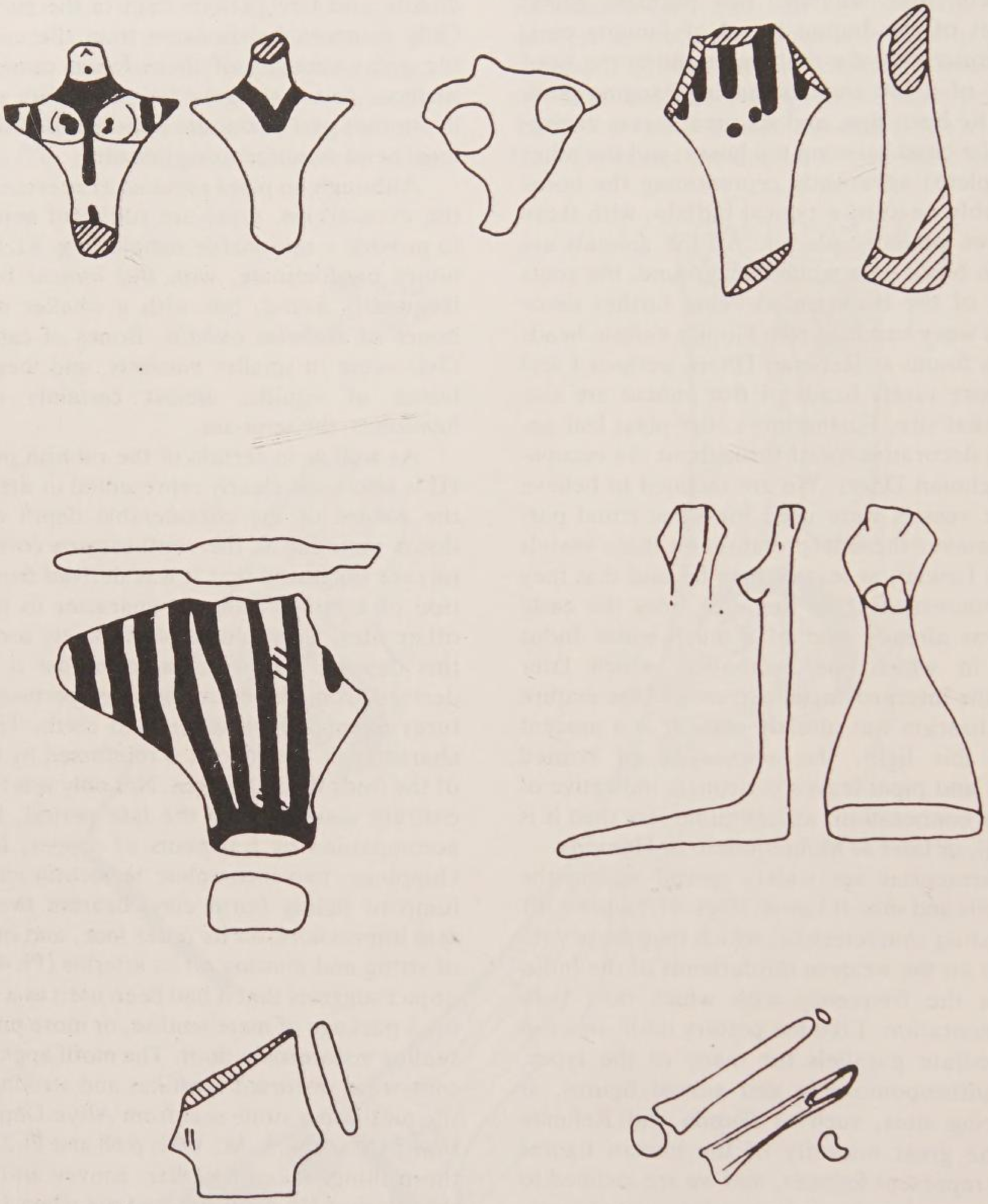

Fig. 41.9. Lewan: Human terracotta Figurines.

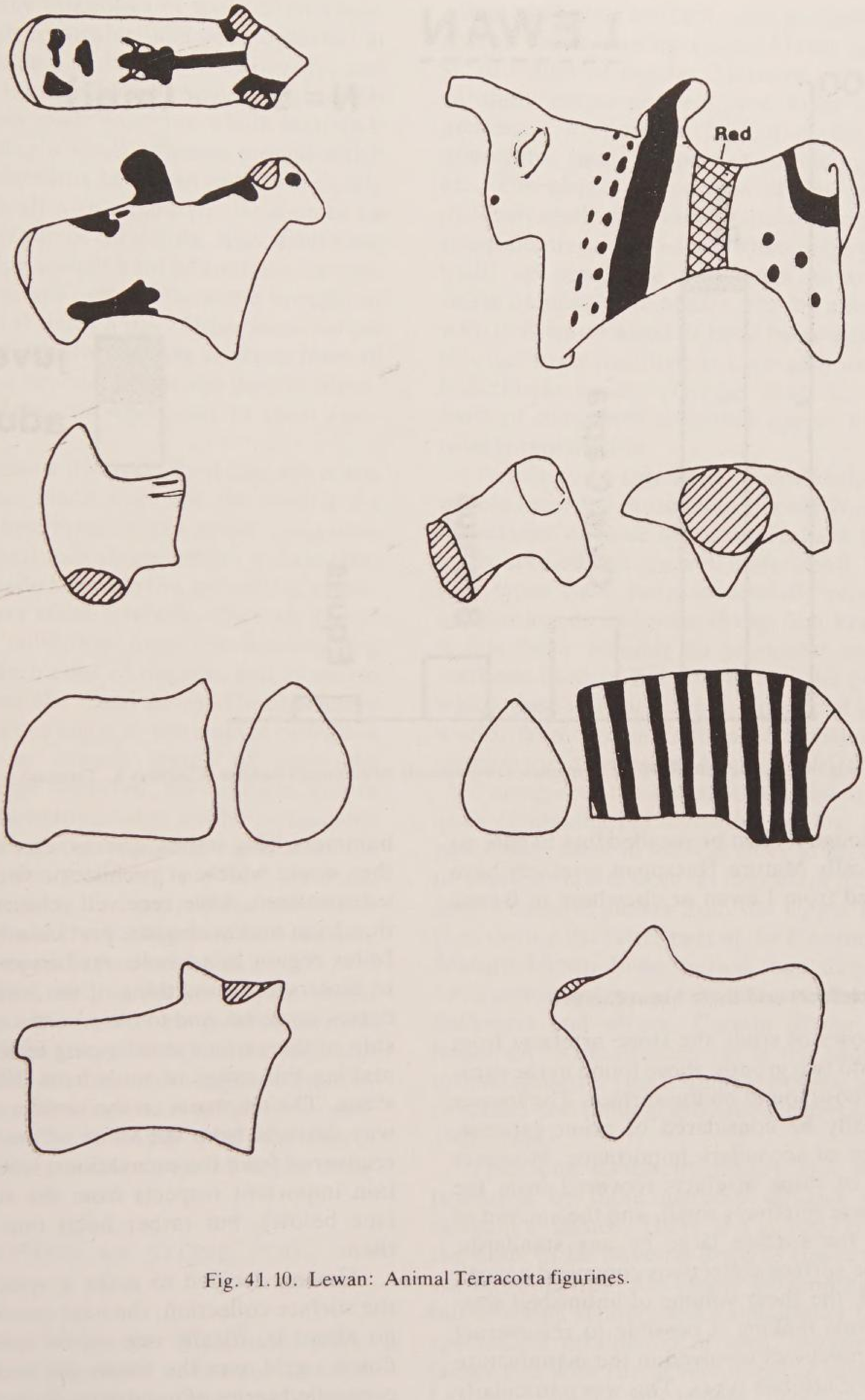

Fig. 41.10. Lewan: Animal Terracotta figurines.

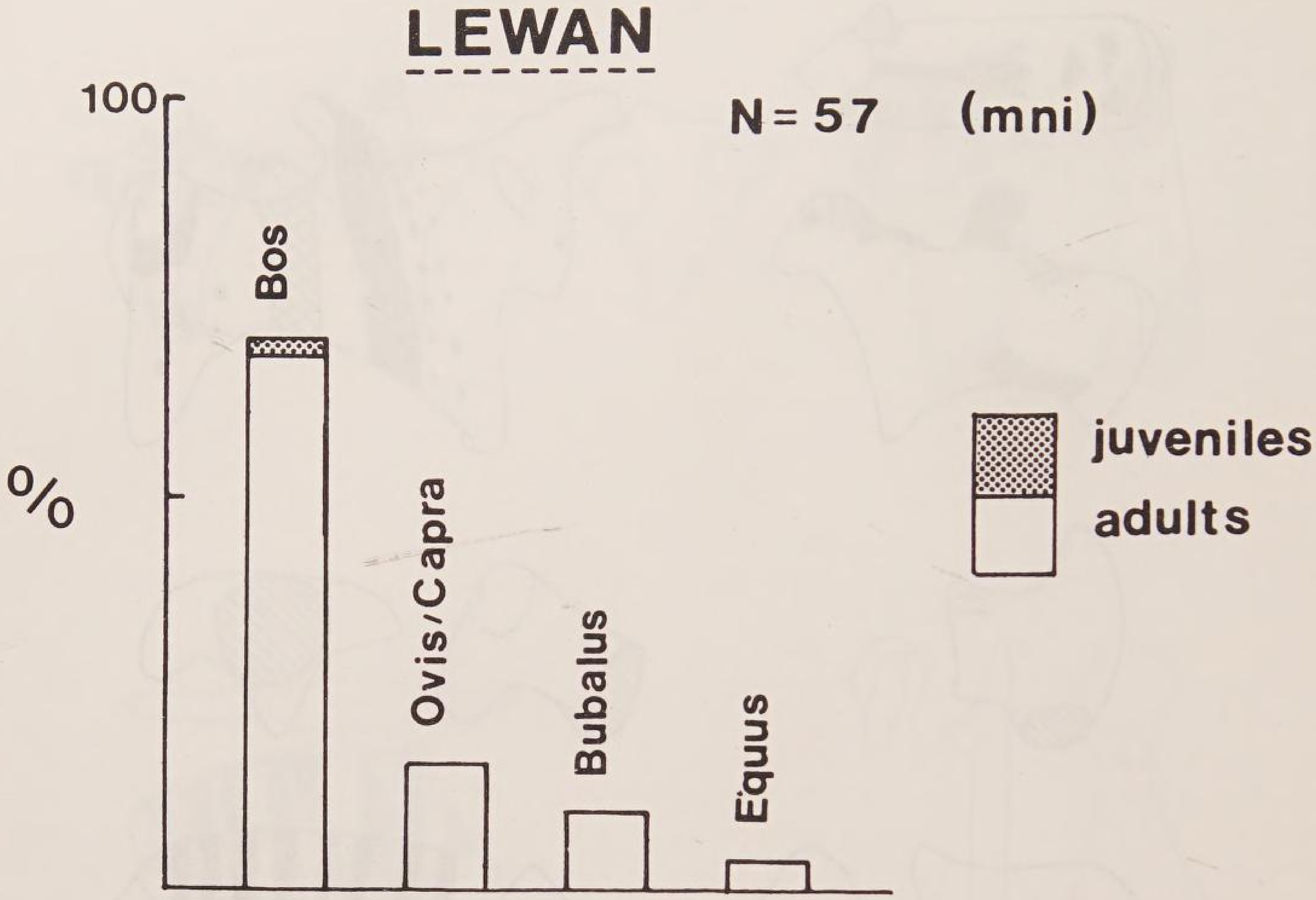

Fig. 41.11. Lewan: Relative frequencies of mammals by minimum number (Courtesy K. Thomas).

periods, although it must be recalled that to date no characteristically Mature Harappan artefacts have been reported from Lewan or elsewhere in Bannu district.

The Stone Artefacts and their Manufacture

For purposes of study the stone artefacts from Lewan fall into two groups: those found in the excavation, and those found on the surface. The former would normally be considered of prime interest, and the latter of secondary importance. However the number of stone artefacts rcovered from the excavations was relatively small, and the amount of material on the surface large by any standards. Therefore the surface collections command a particular interest, the sheer volume of unfinished artefacts and debris making it possible to reconstruct some of the processes involved in the manufacture of a number of artefact types. This was particularly interesting in the case of the larger artefacts, axes, hammers, ring stones, querns, etc. which, although they occur widely at prehistoric sites in the Indian subcontinent, have received relatively little attention from archaeologists, particularly in the greater Indus region as a whole. At Lewan it was possible to understand something of the total range of processes involved, and to observe the overall relationship of the various overlapping techniques used for making this range of tools from different kinds of stone. The emphasis on the surface collection in no way detracts from the value of the stone artefacts recovered from the excavations, which differ in certain important respects from the surface material (see below), but rather helps one to understand them.

Having decided to make a systematic study of the surface collection, the next question was how to go about it. Ideally one would have liked to put down a grid over the whole site and collect from a controlled series of quadrants. In the event this was impossible. For some years before we began our investigation large quantities of tools of all kinds, and microliths in particular, had been collected at random by members of Peshawar University, and by local people on their behalf. Sometimes the collections had been made from the whole surrounding area, including a small adjacent mound which was as rich in microliths as Lewan itself, but clearly required to be dealt with separately. As soon as we started work a group of little girls, who spent their time looking after a small herd of goats on the site, appointed themselves our assistants and brought us collections several times a day. Other local people joined in enthusiastically bringing artefacts from all over the site, and beyond, and it was usually impossible to find out exactly where any of them came from.

For these reasons it was decided that the entire surface collection made from the site during the survey and the first three weeks of the excavation should be analysed as a single entity, a major distinction being made between the microlithic collection and the heavy stone artefacts. The only exceptions were the collection from the bead-making area on the western edge of the site, and of course the material from the excavations. Unsatisfactory as this method of dealing with the surface collection may appear from certain points of view—the amount of debitage collected, for example, can in no way be representative—it is similar to methods employed in making surface collections all over the subcontinent in the past, and perhaps therefore provides a better base for comparison with older collections than would be the case had we been able to employ more sophisticated methods.

The outstanding thing about Lewan was that it was a factory site where a wide range of stone tools had been made. Whatever its other limitations, and whatever limitation circumstances imposed upon us as investigating archaeologists, it provided an outstanding opportunity to study the techniques involved in making a whole range of larger stone artefacts.

CRAFT TRADITIONS OF STONE TOOL MAKING

Two principal craft traditions or sets of stone working techniques are represented at Lewan. The first employs cryptocrystalline silicas (chert and jasper) which break with a smooth concoidal fracture, and when skillfully handled can produce extremely sharp, brittle cutting edges. Flakes and parallel-sided blades of regular thickness were made from carefully prepared cores, and these were further processed to produce backed blades, geometric microliths, small scrapers of various types, burins, etc. The object in the case of this group was to produce small, lightweight artifacts with extremely sharp points and/or edges, which were then used to build up composite tools such as arrow heads, sickle blades, knife blades, etc. by mounting them with mastics on wood or bone hafts. An example of this has been recorded at Mehrgarh on the Sindh-Baluchistan border (Jarrige, 1981: 11, Fig. 4). As parts of composite tools they appear to have been readily replaceable.

Artefacts of this kind (microliths), have been widely recorded throughout the old World, and the techniques of their manufacture have been thoroughly studied and are well understood. Most of the tool types have been successfully reproduced by archaeologists and present day flint knappers, and it has been possible to work out many of the methods used to haft them, and the purposes for which they were used in a number of parts of the world, from a combination of archaeological and ethnographic evidence (Allchin, 1966).

Throughout the Indian subcontinent the techniques of making parallel sided blades, and further processing them in various ways to make a variety of small artefacts were an important element in all major cultural phases from the Upper Palaeolithic (i.e. during the latter part of the Pleistocene) to the Mature Urban Indus period, and they appear to have continued in use long after this time by hunter gatherers and others. Certain of the techniques linger on to the present day in the hands of traditional lapidaries (for a summary of the South Asian evidence and bibliography see Allchin and Allchin, 1982, 1988).

This long continuity makes tool assemblages produced by these methods difficult to date on internal evidence. There is a general tendency for the craft to be directed towards smaller and more varied tools from the Upper Palaeolithic onwards, but to swing steadily and emphatically towards the specialized production of long, regular blades of larger size with the development of urban cultures (Allchin, Goudie and Hegde, 1978). But there are many exceptions to this, and any industry of this kind is limited by the nature and size of the material available, either locally or by transportation from elsewhere.

At Lewan tools of this group were made exclusively from carefully selected cryptocrystalline materials, mainly cherts and jasper, all the techniques involved utilizing the properties of the material (Fig. 41.12). This part of the surface collection will therefore be briefly dealt with in terms of all aspects of technology.

The second set of techniques, including hammering, pecking, polishing and grinding, were used to produce the larger and heavier tools such as axes, hammers, saddle querns, ring stones, etc., from a number of different kinds of rock, chosen for their suitability in each case. Most of these types of tools appear to have been made throughout the subcontinent (and beyond), wherever suitable stone was available, and to have served a wide range of everyday purposes both before, and in some cases after, the introduction of iron. However they have received only a limited amount of attention from archaeologists. Bruce Foote first described them in his catalogue of his South Indian collections, *Indian Prehistoric and Protohistoric Antiquities* (1916). Subbarao (1948), and F.R. Allchin (1957, 1960) described South and Central Indian collections. No material from North India or Pakistan appears to have been studied hitherto. Therefore both the tools themselves and the wide range of interrelated techniques used in making them deserve careful consideration.

Here again the stone working crafts involved appear to have been in use for a long time, some from Upper Palaeolithic times. Others seem to appear somewhat later in the archaeological record, and they undoubtedly come into their own with the establishment of settlements. Certain tools of this kind appear to have continued in use into the Iron Age, and a few such as querns are still in use. As mentioned earlier there are clear indications that suitable stone for their manufacture was imported to the site, certainly locally, and possibly from some distance.

Bead making utilizes both sets of techniques in miniature form and will be dealt with only briefly here as it has received considerable attention elsewhere (MacKay, 1937; Possehl, 1981; Allchin, B., 1979). Its interest in the present case lies in the fact that it appears to have been practised at Lewan alongside the other stone working techniques with which it overlaps in a number of ways.

The Flake and Blade Industry

A. The Excavation

All the artefacts found in the excavation of the pit dwellings and other pits have been put together as a single group because they are from two contiguous periods, which can be regarded for this purpose as forming one single period, and because so few specimens were found in any single pit excavated that little could be said about them. Their interest is increased when they are seen as a body. Table 41.1 gives a breakdown of the excavated material into primary flake and chips (i.e. virtually unclassifiable debitage), flakes from previously struck cores, and classifiable artefact types. Table 41.2 shows the numbers and percentage of classifiable artefacts from both the excavated collection and the surface collection.

Table 41.1: Initial breakdown of excavated material

Primary flakes and chips	33.48%
Flakes from previously struck cores	33.91%
Classifiable artefact types	32.62%

A clearer impression of the industry can probably be obtained from the illustrations (Figs. 41.12, 41.17).

In terms of the general progression of size and variety of tool types found in stone industries of this kind referred to above, the character of the assemblage from the excavation is in keeping with those from early settlement sites elsewhere in the subcontinent. Characteristics which specifically indicate this are the relatively high proportion of blades (66.44 percent of the total of classifiable artefacts), and the size of both blades and blade cores, together with the presence of a fairly wide range of other artefacts as shown in Table 41.2. There is more emphasis on blade production that is usually seen in an assemblage from a Mesolithic site, assumed to be predominantly associated with hunting and gathering. But the full range of tool types used by a community with a wide variety of activities, probably including hunting and gathering, that is to say

Table 42.2. Lewan surface and excavated microlithic collections: Numbers and percentage of classified artefact types

Artefact type	Surface		Excavation		Bead Working	
	No	%	No	%	No	%
Blade cores	40	3.90	4	2.63	—	—
Blade core rough-outs	33	3.20	2	1.32	—	—
Blade core fragments	20	2.00	13	8.56	21	11.86
Blades V	340	33.30	31	20.39	—	—
Blade fragments*	—	—	70	46.05	65	36.72
Blade core trimming flakes	—	—	6	3.95	—	—
Scrappers	463	45.40	10	6.58	39	22.03
Burins	16	1.60	5	3.29	2	1.13
Burins spalls	—	—	1	0.66	—	—
Saws	6	0.60	—	—	1	0.56
Awls borers and drills	18	1.80	3	1.98	31	17.51
Fabricators	47	4.60	5	3.29	11	6.21
Flake cores	3	0.30	—	—	—	—
Geometrics	32	3.10	2	1.32	2	1.13
Trimmed points	2	0.20	—	—	5	2.82
Artefact Total	1020	100.00	152	100.00	177	99.97

* only those of which more than half remained were included.

+ these were nearly all broken, therefore only blades of which more than half clearly appeared to remain were counted.

a subsistence economy, is present. Both in style and range of tools this industry is quite distinct from the highly specialized blade industries of the cities of the Mature Indus Culture. In general terms therefore the character of this group of artefacts is in keeping with its cultural context, that of a small settlement of the late fifth to early fourth millennium B.C. What is perhaps more interesting, and more tantalizing in view of the limitation of the site, is the way in which it differs from the surface collection.

B. The Surface Collection

Due to the way the surface collection had been made (as described above) it was obviously highly selected, with the emphasis upon attractive, easily recognized pieces such as blade cores, blades and delicately trimmed artefacts. There was clearly no point in attempting to quantify the debitage, as what was brought in could not possibly be representative of the vast quantities that lay among the larger stones over much of the site. Furthermore, as pointed out above, the way tools of this kind are made is thoroughly understood, and therefore there is not the same positive reason for studying the debitage as in the case of the larger tools. In going over the collection, however, rather over 500 flakes definitely struck from small, carefully prepared flake cores were found. This contrasts with the very small number (3) of flake cores (see Table

41.2), and one can only assume either than the cores were overlooked, or that the flakes were produced elsewhere and brought to the site.

The assemblage of classifiable artefacts differs in a number of ways from that recovered from the excavation: blades from only 33.30 per cent of the total, as opposed to 66.44. Blade cores (Pl. 41.10) do not differ so greatly in proportions: 3.9 percent, in the surface collection and 2.63 in the excavation. The most significant difference is in the percentage of scrapers: 45.4 percent, in the surface collection, as opposed to 6.58 percent in the excavated material. Scrapers (Pl. 41.11) are in fact jigs, or tools for making tools, and their presence in such numbers indicates that other crafts than those of making stone artefacts were practiced at Lewan. Scrapers are generally considered to have been used for working wood, bone and other substances; small ones of this kind, many with concave working edges, would have been eminently suitable for making the shafts of arrows, sickles and other composite tools, of which geometric microliths and sections of parallel-sided blades commonly form part. Most of the other tool types are present in such small numbers in both collections that percentages may have little significance. The presence of geometric microliths, small sections of parallel -sided blades, awls, borers and burins are none-the-less a clear indication of the variety and diversity of tools made at Lewan (Pl. 41.12 and Fig. 41.13).

The size differences between the blades and blade cores in the two assemblages is noticeable. Average measurements are not really meaningful when so few complete cores are available in the assemblage from the excavation which includes only four complete cores, as opposed to 40 in the surface collection. The differences in dimension of the cores are quite striking, however, and they do bear out the general impression one has on surveying the two groups of artefacts, therefore they are given here for what they are worth:

Table 41.3. Dimensions of blade cores

	Length	Width	Thickness
Excavation			
Maximum	8.20	4.40	4.20
Average	4.47	2.59	2.60
Minimum	2.20	1.75	1.40
Surface Collection			
Maximum	4.50	4.10	3.20
Average	2.79	2.08	.51
Minimum	1.40	0.90	0.60

Taken as a whole, in terms of the general progression of blade industries referred to earlier, the Lewan surface collection resembles assemblages from sites associated with hunter gathers and small-scale subsistence agriculturalists of much of the subcontinent, particularly north and northwestern India, during the early Holocene in regard to both size and percentages of various artefact types. In view of the nature of the site there is no means of knowing what time span the assemblage covers. The similarities and differences noted between it and the excavated material could well be taken to demonstrate that they were contemporary, and complementary aspects of the same craft tradition practised by the occupants of the site and those living in the immediate locality. If this hypothesis were correct, the excavated material would represent mainly domestic equipment, and that from the surface the full complement of artefacts manufactured on the site for domestic, agricultural, hunting and other purposes and, in view of the amount of material, probably also for export. What we cannot know at present is for how long microliths were made at Lewan. On the internal evidence of the surface collection itself it could represent a time span extending both long before and long after the period of occupation (late fourth to early third millennium B.C.). Indeed the use of the site by hunter gatherers and others for making artefacts over a long period of time might well account for the vast quantity of material.

This brings us to the interesting question of how far the large quantity of material represents an accumulation through time (and if so how long a time?), and how far it represents the extent of the area it served? This question, or rather group of questions, is probably better dealt with alongside similar questions relating to the other artefacts made at the site which are discussed below, as both lead one to consider Lewan in relation to the culture of the Bannu region, and thence to the wider relationships of the Greater Indus System as a whole.

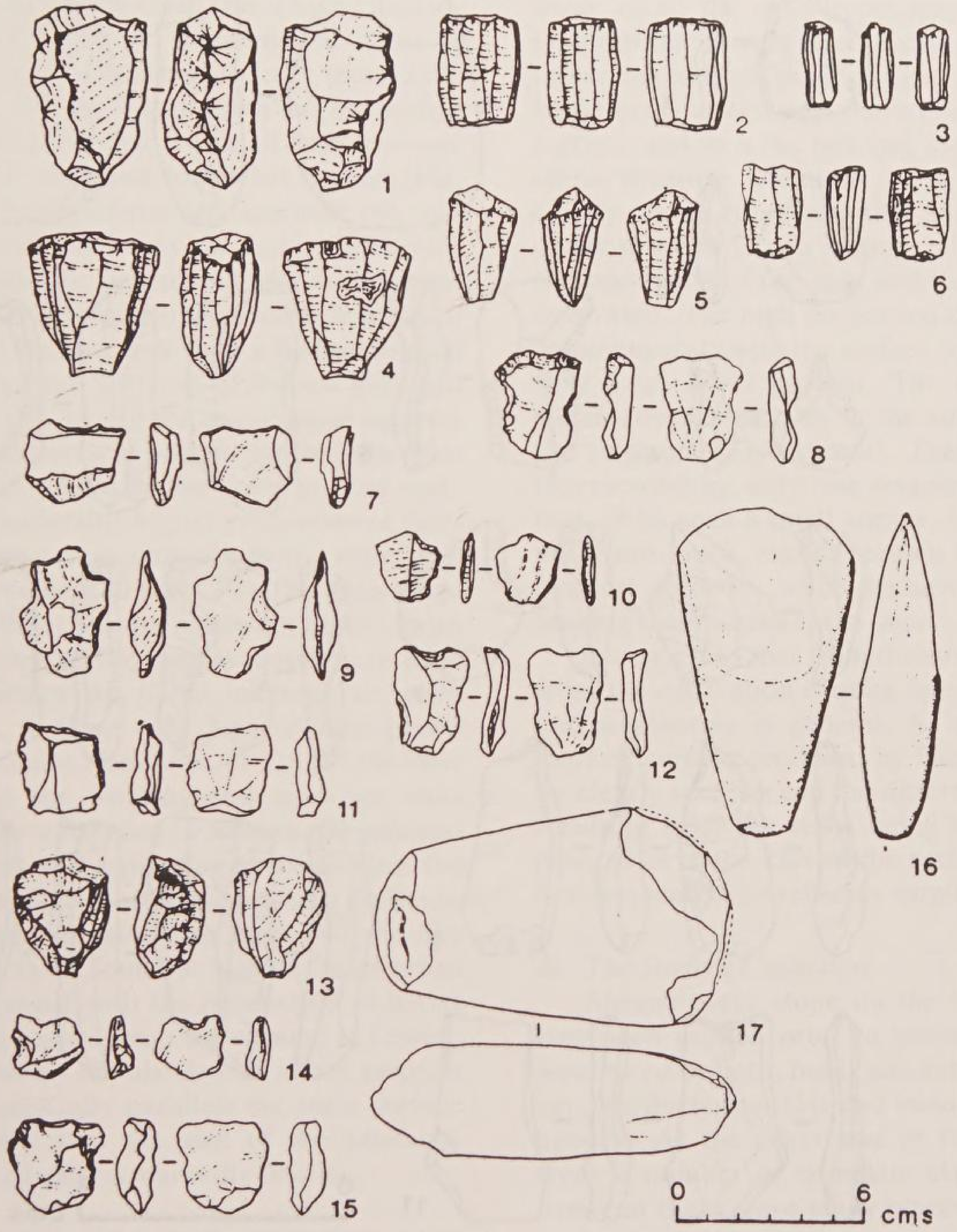
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Fig. 41.12. Stone artefacts and by products of the microlithic blade industry from Lewan. Nos. 1 to 15; stone axes from Lak Largai, Nos. 16 and 17.

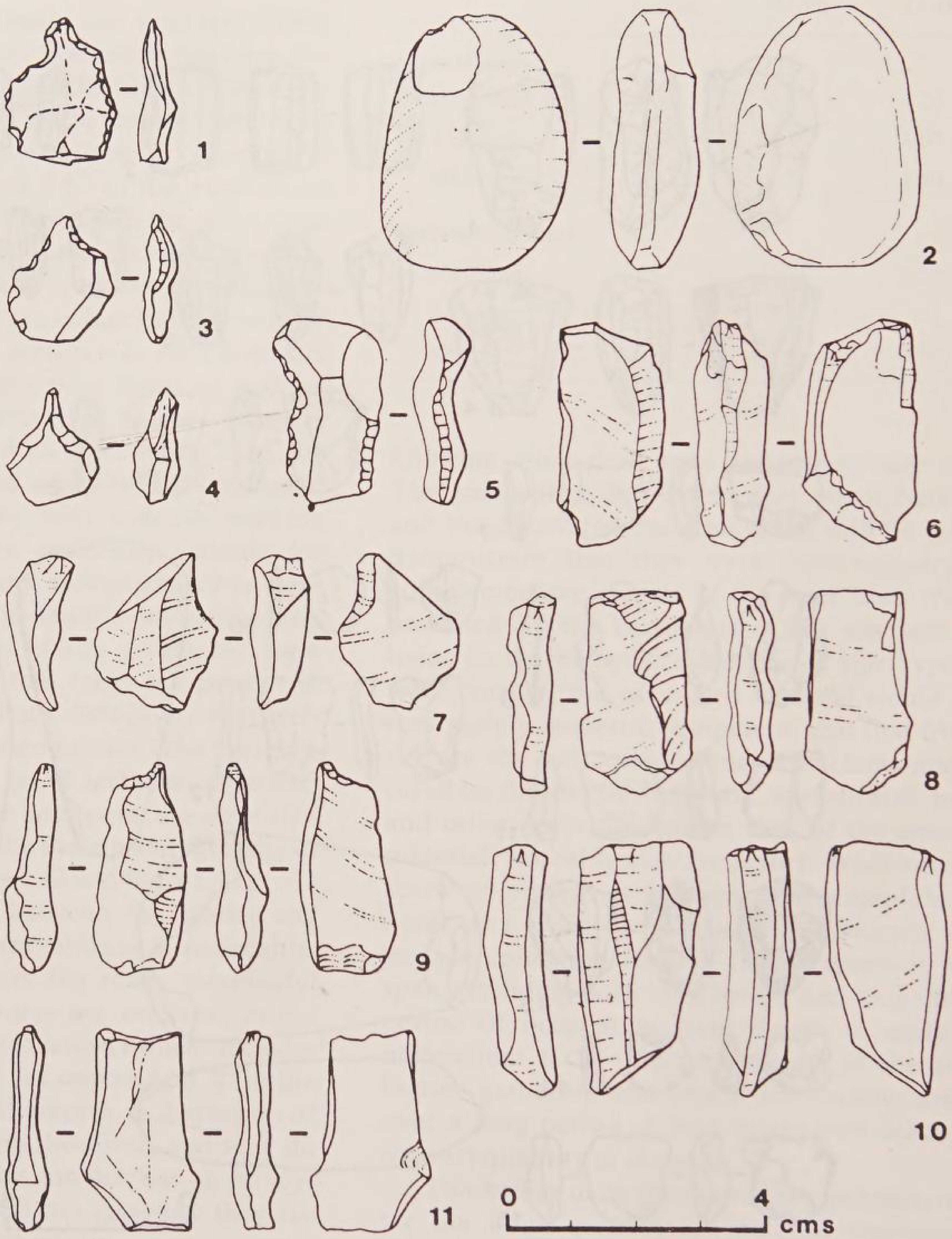
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Fig. 41.13 Lewan surface collection: Stone artefacts from the bead making area Nos. 1 to 5. General Nos. 6-11, 1 & 3 AW1/Scrapers: 2Bead working hammer: 5 scraper 4-6 to 11 burins.

THE BEADWORKING AREA

In the course of the survey we noted an area approximately ten meters square, on the western side of the site, in which there was a high concentration of brightly colored fragments of stone of various kinds, most of which were to be found elsewhere on the site in, but in smaller quantities. There was also an extremely small hammerstone battered at both ends and somewhat broken (Fig. 41.13, No. 2). The microlithic artefacts from this area were kept separate, and are classified in Table 41.2 col. 3. Apart from the unusually high proportion of pieces of brightly colored stone, notable features of the collection from this area were a fine unfinished bead, shaped but not pierced, of striped pink and cream quartzite (Pl. 41.13); the unique small hammer stone which compares in size to the buffalo horn hammers currently used by the Cambay bead makers; and the considerably higher proportion of drills in this collection are in contrast to the other two (17.15 as opposed to 1.80 and 1.98).The drills range from small awls or borers made on flakes, with short strong points of the kind that appear to have been used to make the initial indentations when piercing beads, to those with long, slender points worked on microlithic blades (Pl. 41.13). All the latter were broken at the working end, and one must assume that they were used to deepen the indentations and complete the piercing process. Thus the manufacture of beads is seen to be closely similar to that of ringstones in miniature form. No rod-like drill heads, like those found at Mature Indus urban sites, and associated with the production of barrel beads up to five inches long, were found at Lewan, nor were any beads of this size. In other respects the collection generally parallels the main surface collection, except that the size of the artefacts, particularly the blades, is markedly smaller.

THE HEAVY OR GROUND, PECKED AND POLISHED STONE ARTEFACTS FROM THE EXCAVATION AND THE SURFACE COLLECTION

A. Excavated Material

The small number of artifacts of this general category recovered from the excavation show that all the main artefact types identified in the surface collection are represented in the excavation, with the exception of axes (see Table 41.4, and Pl. 41.14). Their absence from this small collection is not surprising as they form only 2.43 percent of the much larger surface collection: it is rather the presence of all the other types among the excavated material that should be regarded as significant from the archaeological point of view. The proportion of hammers is interesting, (seven out of a total of 18 pieces), and so is the fact that four of the seven are stone dressing hammers which demonstrates as clearly as anything can that the manufacture of heavy stone tools was an integral part of the life of the occupants of the huts and the users of the pits excavated. The high proportion of hammers is also commensurate with the surface collection, of which they form 34.41 percent. The only other group which comes near this in the surface collection is the ringstones (34 percent). These by contrast are represented by only one fragment in the excavation. With such a small sample, however, this does not mean much, except perhaps that they are used and lost outdoors, while the hammers employed in making them were kept in doors.

In contest to that from the surface, the material from the excavation is quite free of desert varnish, and weathering in general. As a result the pockmarked surface produced by hammer dressing can be clearly seen, as can the different type of surface resulting from the stone being broken. This is of interest as in the case of the surface material these features tend to be veiled by varnish and weathering.

B. The Surface Collection

Almost every stone on the surface of the site had been broken prior to becoming varnished or weathered or both, but it was not always possible to say positively that this had been done by a human agency. At the other end of the spectrum there were a number of complete classifiable tools. In between there were many pieces that appeared to be incomplete or broken tools, fragments of tools or debitage from their manufacture. Closer inspection showed that many were not really artefacts, but utilized stones. It gradually became clear that while some of the tools were artefacts in the true sense of the word, having been completely fashioned by flaking, hammer dressing or grinding, or a combination of these processes, so that little or none of the original outer surface of the cobble remained, others were stones that had been selected because they came near to the required shape for a particular purpose, and had been slightly trimmed by one of these processes to shape them just enough to be useful

We attempted to classify the assemblage on the basis of function, wherever this could be reasonably inferred, and form. Certain types such as axes and ringstones were fairly well defined, but clear demarcation lines between groups proved singularly hard to achieve. It soon became apparent that the reason for this was that they had probably never existed in the minds of the tool makers, an observation that had been made by both Foote (1916: 17-18) and F.R. Allchin (1957: 322) with regard to South Indian material of this kind. Table 4 represents an attempt at classification but, as will be demonstrated shortly, this really breaks down with regard to various kinds of hammers and upper and lower grinding stones, which tend to overlap and show evidence of having been used for several purposes, or adapted following breakage or heavy wear. Stone balls although plentiful on the site, proved to be absolutely unclassifiable for these reasons. Figures give some idea of the character of the tools that were the end products of this craft, and the stone jigs or tools for making tools used in their production. The various classes of artefacts are individually discussed in Table 41.4.

Table 41.4. Lewan heavy stone artifacts.

Artefact Type	Surface Collection		Excavated Material	
	No	%	No	%
Axes (or adzes)	6	2.43		
Axe-hammers	11	4.45	1	
Hammers	85	34.41	7	
Palette Stones	22	8.91	2	
Grinding Stones	10	4.05	4	
Rubbing Stones	13	5.26	2	
Saddle Querns	16	6.48	1	
Ringstones	84	34.00	1	
Total	247		18	

+ Percentage are not given, as they would be meaningless with such small numbers.

* In addition there were a number of roughly spherical stones which are not separately enumerated because they appear to overlap almost totally with other groups. If they had one principal use it was probably as Sling Stones, which are briefly discussed here.

Axes (6)

(See Pls. 41.15; Figs. 41.14, Nos. 5 and 6; 41.15, No. 8). In outline the Lewan axes resemble elongated triangles with slighty convex sides. They are rounded or oval in section, taper towards the but end and thin towards the other end to a blade that is more or less lenticular in section with slightly curved cutting edge. All six appear to be made from carefully selected stones approximating to the size and shape of the finished tool. Five have been pecked or hammer dressed to some extent to bring them closer to the "norm", and then ground to form the blades: the sixth has only the blade ground. None are completely symmetrical, so it might be argued that any or all of them are technically not axes, but adzes. In the present context this does not seem to be a question of great importance. In some cases there are slight signs of wear around the centre of balance which suggests that they may have been inserted into wooden shafts, or bound onto them in some way, but this is somewhat obscured by weathering, and no more specific evidence is available on this question at present.

Why so few axes and axe fragments were found on the site is not clear. Grinding an axe blade is obviously a long and tedious business, and an axe once made may well have been regularly carried by its owner when away from the settlement, as axes frequently were in recent historical times, and sometimes still are, in many parts of the subcontinent. They are used for many purposes such as cutting wood, lopping branches to feed animals, and as weapons of defence and offence against wild animals and human enemies. If this was the practice in the fourth to third millennium, they would tend to become lost or broken and discarded away from the settlement.

Axe-Hammers (11)

(See Pls. 41.15, 41.16; Figs. 41.14, Nos. 1 and 4; and 41.15, No. 8). Axe-hammers are made by the same techniques as axes, except that they are not ground to a sharp working edge. Three of the eleven were obviously axes that had suffered heavy wear or breakage to the blade, and been utilized as hammers. Others may have been intended for use as axes, but never finished, or were axe-shaped stones that were simply used as hammers. It is possible that some were used as wedges for splitting wood. There is really no clear demarcation line between this group and certain other types of hammers.

Hammers (85)

Hammers form the largest group of tools at Lewan. As a group they are hard to define, although it is easy to recognize a stone that has been used for heavy percussion work. At Lewan any suitable stone that came to hand appears to have been used for hammering, grinding, polishing, etc., and in many cases the same stone has obviously been used for more than one purpose. However, as we studied the surface material it became increasingly clear that hammers of various kinds played many roles in stone artefact production, and served other purposes as well. Therefore an attempt was made to classify them, and to work out what some of the purposes were that they served, which left such clear signs of hard and heavy use. More can perhaps be learnt from the illustrations than from verbal descriptions. The following four types of stone hammers were recognised, but all tend to grade into one another:

Hammer Type	No
Cylindrical	28
Pointed	38
Discoidal	6
Cuboid or Sperical	13

Cylindrical Hammers

(See (Pl. 41.16 and 41.20). These tools range from selected stones minimally worked to define the shape to those that are carefully hammer dressed, ground or polished all over. By definition they are round in section, but some pieces included might more accurately be described as being square with rounded corners; there is a steady gradation in this respect. Some tend towards pointed hammers, and others grade into lateral grinding tones, as which they may well also have served. All show signs of heavy percussion on one or both ends, and some appear to have been much reduced in length by having their ends worn down and broken in use. The indicates that they were used to hammer substances as hard, or nearly so, as themselves, that is to say other stones. Possibly these were the tools used to break the pebbles and cobbles on the site, and for the initial trimming of certain artefacts. Like the axes some seem to be worn around the point of balance in a manner that suggests hafting, and two have a small pit worked on one side, perhaps to enable a wedge to be used to hold them in a socket or binding.

Pointed Stone Dressing Hammers (38)

(See Figs. 41.14, No. 9; 41.15, Nos.1—4, 6, 7; 41.16, Nos. 1-4, Pls. 41.17 and 41.18). Virtually all this group are made from selected stones, shaped by minimal grinding or none at all. They all show marked battering and chipping at one or both ends, and most of them also show a distinctive kind of splitting or splintering, especially at the pointed end. At one end of the spectrum they come close in shape to the more slender, minimally worked cylindrical hammers: at the other they resemble long, slightly asymmetrical cigars. They show no visible signs of hafting, and the majority rest easily in the hand. Their probable association with the production of ring stones is discussed below. It seems probable also that they were used to dress other artefacts as well, and their pointed shape is compatible with the finely pitted surfaces of almost all the more finished tools on the site, including querns. The battering on both ends suggests that they may sometimes have been used in conjunction with larger hammers as punches or cold chisels.

Discoidal Hammers (6)

(See Pl. 41.16 and Fig. 41.14, No. 3). These are made from flat stones, sometimes shaped by trimming the edges, where they also show signs of heavy battering, probably due to use. They show no signs of hafting, but can be conveniently gripped with the finger and thumb. As a class they grade into pallet stones, and into the infinity of pebbles with signs of battering which are to be found on the site.

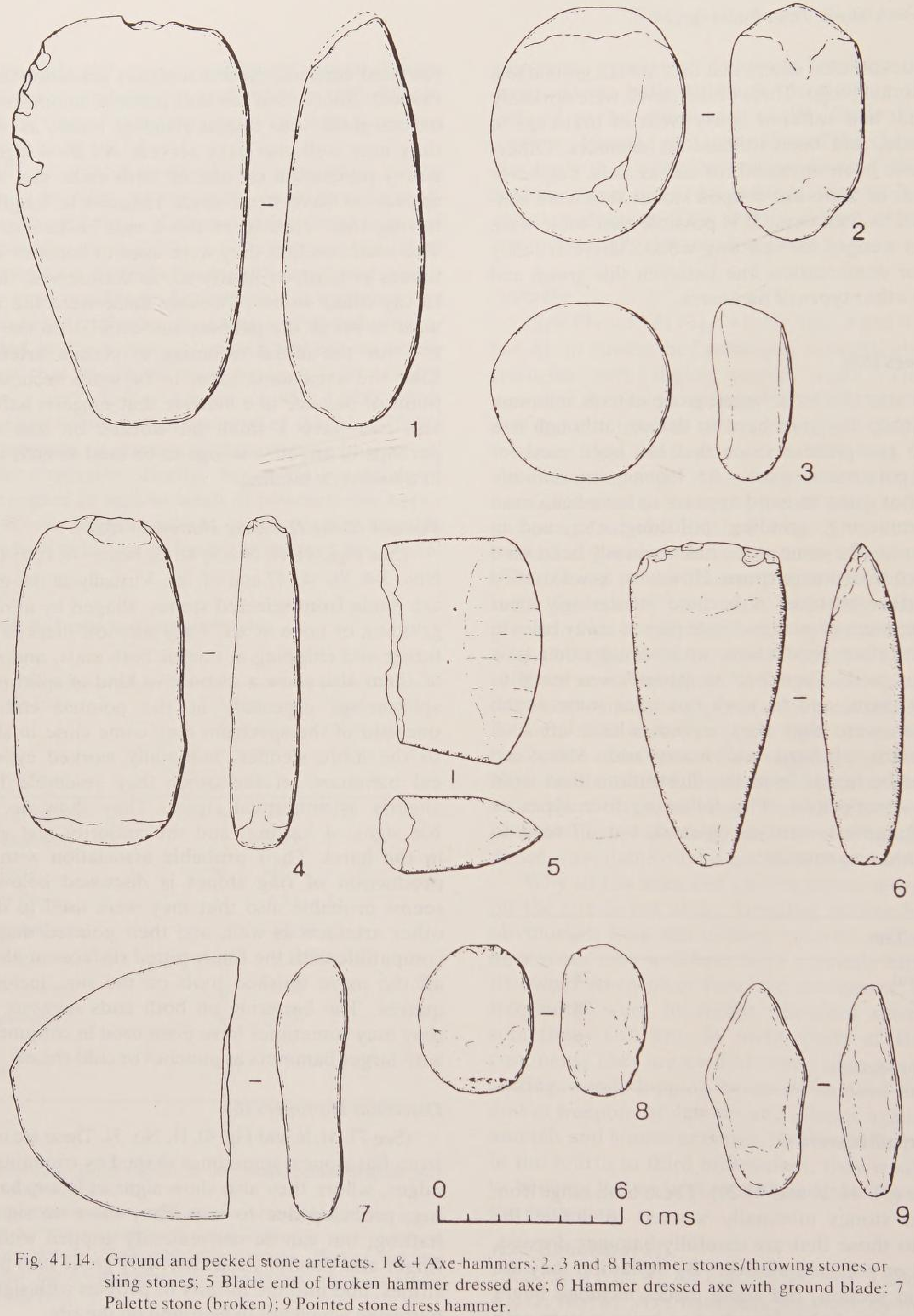

Fig. 41.14. Ground and pecked stone artefacts. 1 & 4 Axe-hammers; 2, 3 and 8 Hammer stones/throwing stones or sling stones; 5 Blade end of broken hammer dressed axe; 6 Hammer dressed axe with ground blade: 7 Palette stone (broken); 9 Pointed stone dress hammer.

Cuboid and Spherical Hammers (13)

(See Pls. 41.16, Nos. 2 and 8; and 41.20). These range from cubes carefully ground on all faces, and battered or rounded at the corners, to approximately stones battered over all or part of the surface. They grade into the class of sling stones, and this may indeed have been their primary function. They include many colored stones, presumably carefully selected. One found in the excavation was an almost perfect sphere, very carefully worked.

Palette Stones and "Anvils" (22)

(See Fig. 41.14, No. 7; and Pl. 41.19. Palette stones were made from approximately round or oval, flattish pebbles, sometimes minimally shaped by grinding. They are usually made of hard sandstone which provides an abrasive surface, and are recognized by striations on one or both sides, apparently due to grinding hard gritty substances, and/or irregular pitting which suggest that they were used as "anvils" for some purpose—perhaps resting a blade core when striking off blades. They grade into the class of discoidal hammers and, like them, into the multitude of used and battered pebbles on the site.

Palette stones have a wide distribution in space and time. They have been found with the worn surfaces stained with red ochre at Upper Palaeolithic sites on the eastern margins of the Thar desert (Allchin, Hegde & Goudie, 1978).

Grinding Stones (10)

(See Pls. 41.13, 41.21). Grinding stones are made from selected pebbles or cobbles of hard sandstone or meta-igneous rock with one face ground to provide a concave surface, which in all cases appears to have been heavily used for grinding. Seen from above, the grinding surface is approximately square, and seen from the side the stone is roughly triangular in section. This gave the impression initially that one was looking at a worn and rather formless saddle quern, particularly as all those in the surface collection (with one exception mentioned below) were broken at the "thin end" of the triangle. An unbroken specimen found in the excavation, however, had the same shape in side elevation as the rest, simply tapering to a point were they were broken, and showing that this shape must have been deliberately chosen for certain grinding processes. The shape of concavity and direction of grinding, in as far as this could be discerned by eye and by feel, both indicate that these tools were used for grinding and polishing axe blades, and the surfaces of the better finished hammers, ringstones, etc.

An exception to the common form was a carefully finished rectangular stone with one concave face that complemented the curve of the axe blades in the same manner as the other grinding stones did (Pl. 41.19). This appeared to have doubled as a rectangular rubbing stone.

Rubbing Stones (13)

This is a particularly difficult group to isolate, as it grades into and overlaps with almost every other group, and particularly with cylindrical hammers with which they seem to have been more or less interchangeable. These tools are made of a wide variety of raw materials, and range from suitably shaped selected stone to stone bars, carefully hammerdressed and ground, regular in thickness, and square or rectangular in section with rounded corners. They are recognized by wear striation on one or more sides of the long axis.

This group of tools appear to be suited for use with saddle querns, as similar tools are today in many parts of the sub-continent chiefly for grinding vegetables, herbs and spices. In as far as they were used in this way, they appear to have been domestic tools rather than jigs for the production of other stone tools, but many individual examples appear to have had a double role in this respect.

Saddle Querns (16)

(See Pl. 41.13). This is an easily defined group of tools, and conforms to the saddle querns widely distributed in space and time throughout the Indian Sub-Continent and beyond, and still in use for certain purposes in villages. They are made from selected coarse grained stone, with the grinding surface rendered more abrasive by pecking or pitting, and are carefully shaped to the traditional "saddle" form (Pl. 41.14). All those found at Lewan were broken, presumably in the course of manufacture, as they showed no obvious signs of wear on the grinding surface. These observations show that saddle querns were probably end products of the processes of manufacture at Lewan. They probably also indicate that most finished saddle querns were exported from the site.

Ringstones (84)

(See Figs. 41.15, Nos. 5 and 6; 41.16). Ring Stones form the second largest artefact group at Lewan, exceeding hammers by one. The feature that makes the group relatively easy to define is the perforation deliberately made through the centre of the stone. Some are selected, naturally shaped flat stones, similar to a small palette stone with a carefully worked hole through the centre. Most ringstones of this kind are of sandstone. Others are similar, but have been shaped by grinding the outside edge; others again, usually those made of harder rock, have been made by hammer dressing followed by grinding and sometimes polishing also. The most elaborately created are those worked from nodules (probably large cobbles) of hard meta-igneous rock. They have been chipped and hammer dressed to the approximate shape, then ground and sometimes polished either before or after the perforation was made. The result is a fine spherical ringstone, resembling a gigantic bead with an hour glass shaped perforation, which must have required many hours of skillful work to produce.

The 84 ringstones at Lewan were in varying stages of completion, which allowed us to reconstruct something of the way they were made. The processes involved were the same as those employed in making other tools, except for the performation. This had evidently been done by first making two depressions in the stone, opposite each other on opposing faces, and deepening them until they met. The perforation, once made, must have been enlarged to the required size and to a regular shape. For this operation the pointed stone dressing hammers already described would be ideally suited, and there can be little doubt that the ring stone were made by using them. It must have been difficult and tedious work, and many broke before they were completed. There appears to have been no established order for the various processes, some being perforated at an early stage, and others only after shaping and polishing were complete.

Ring stones have been made in antiquity in many parts of the world, but as far as the Indian subcontinent is concerned they have been recorded in large numbers only in the Bannu region, although they occur in small numbers in a number of other contexts. In Mature Indus urban contexts they have generally been referred to as mace heads, following Marshall (1931, pp. 459-461), who seems to have been following the terminology then used throughout the Ancient World. In Central India they are shown in rock paintings apparently serving as weights for digging sticks, and there are records of their being made by women of the Kung or Southern Bushmen, and used for this purpose in Southern Africa during the last century. Smaller ring stones might well have served as weights for looms, spindles and fishing nets. Fisherman on the Manchar Lake in Sind today use perforated potsherd to weight their nets. Some of the intermediate ones may have served as weights for bolases (see below), and the larger ones could have been used either as mace meads, or as weights for a variety of purposes. But what precise purpose of any of Lewan ringstones served there is at present no means of knowing. This is an interesting problem for future research.

Sling Stones

This group covers a whole range of approximately spherical and cuboid stones, ranging from the hammer sub-group so described to battered pebbles of roughly the same shape and size. Many are clearly made from the worm down or broken remnants of artefacts of all kind, but especially hammers. We abandoned the attempt to enumerate them partly on this account, and partly because, if our interpretation of their use set out below is correct, natural pebbles must constantly have been used for this purpose, as they are today. This makes the problem similar to that of identifying pointed stone-dressing hammers, for example, but infinitely more uncertain, because almost any pebble will serve as a sling stone, and there are no characteristic signs of wear.

Slings and sling stones are used widely throughout the subcontinent today, chiefly by boys for hunting birds and small animals. Bannu is no exception to this, and in addition stones of the same kind are used in small bags attached to long cords as bolas for capturing cranes and other large birds alive. Stones are also thrown at animals and birds when hunting. It seems a reasonable assumption that our stones served these purposes in the past as they do today, and were also used in defence and war. Some of those used may well have been specially prepared for particular purposes. Both Marshall and Wheeler identified sling balls at Mohenjodaro and Harappa, where they also found

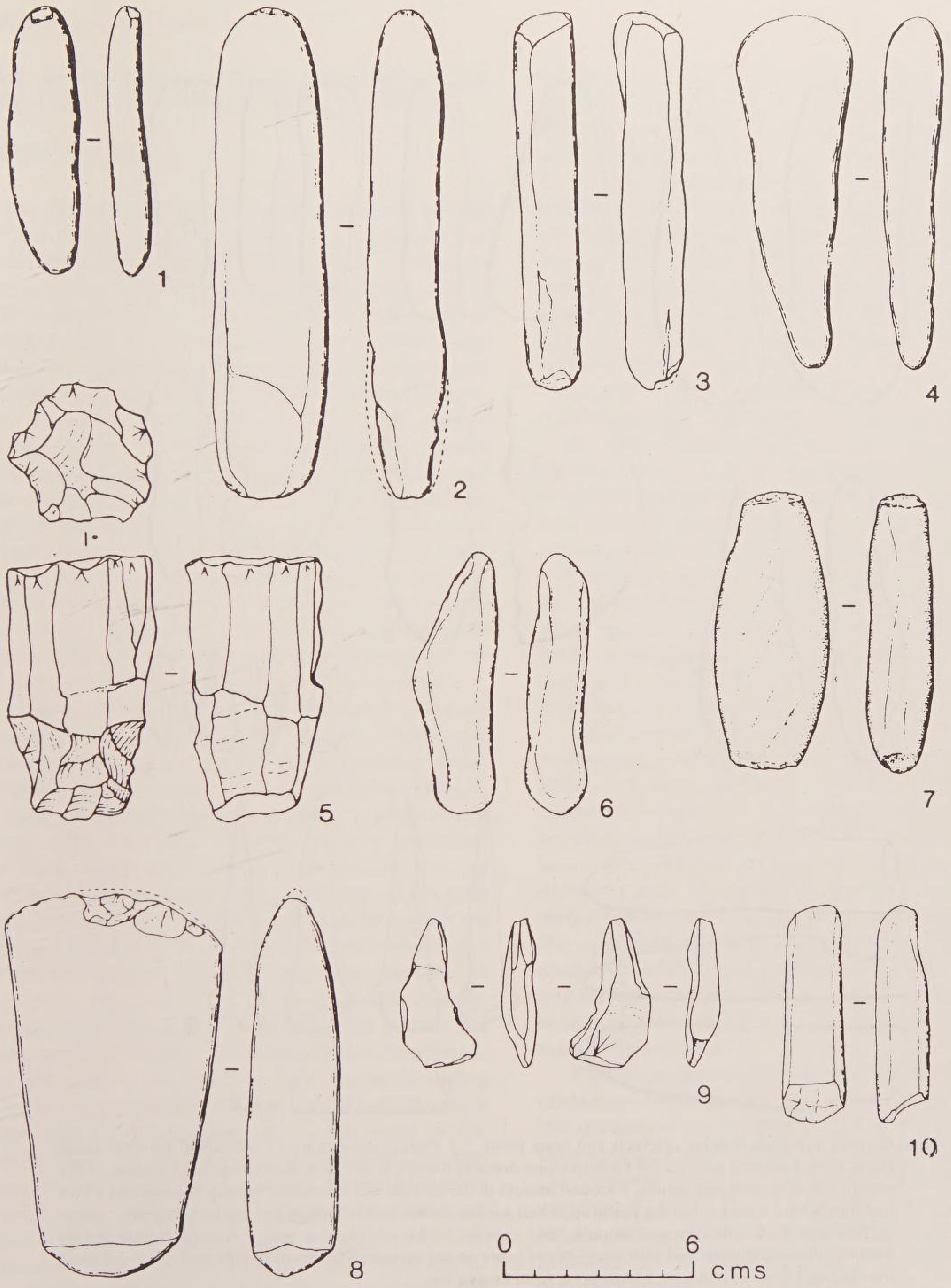

Fig. 41.15. Ground and pecked stone artefacts, stone dressing hammer and blade core from excavation. 1-4, 6-8 & 10 Surface collection; 1-4, 6, 7 & 10 Pointed stone dresing hammers (1 & 7 show typical battering and 2 shows shattering characteristic of this group of artefacts); 5 Cyclindrical blade core from excavations; 8 Axe-hammer which appears to be a damaged stone dressed axe, re-used as a hammer; 9 Burin from excavation.

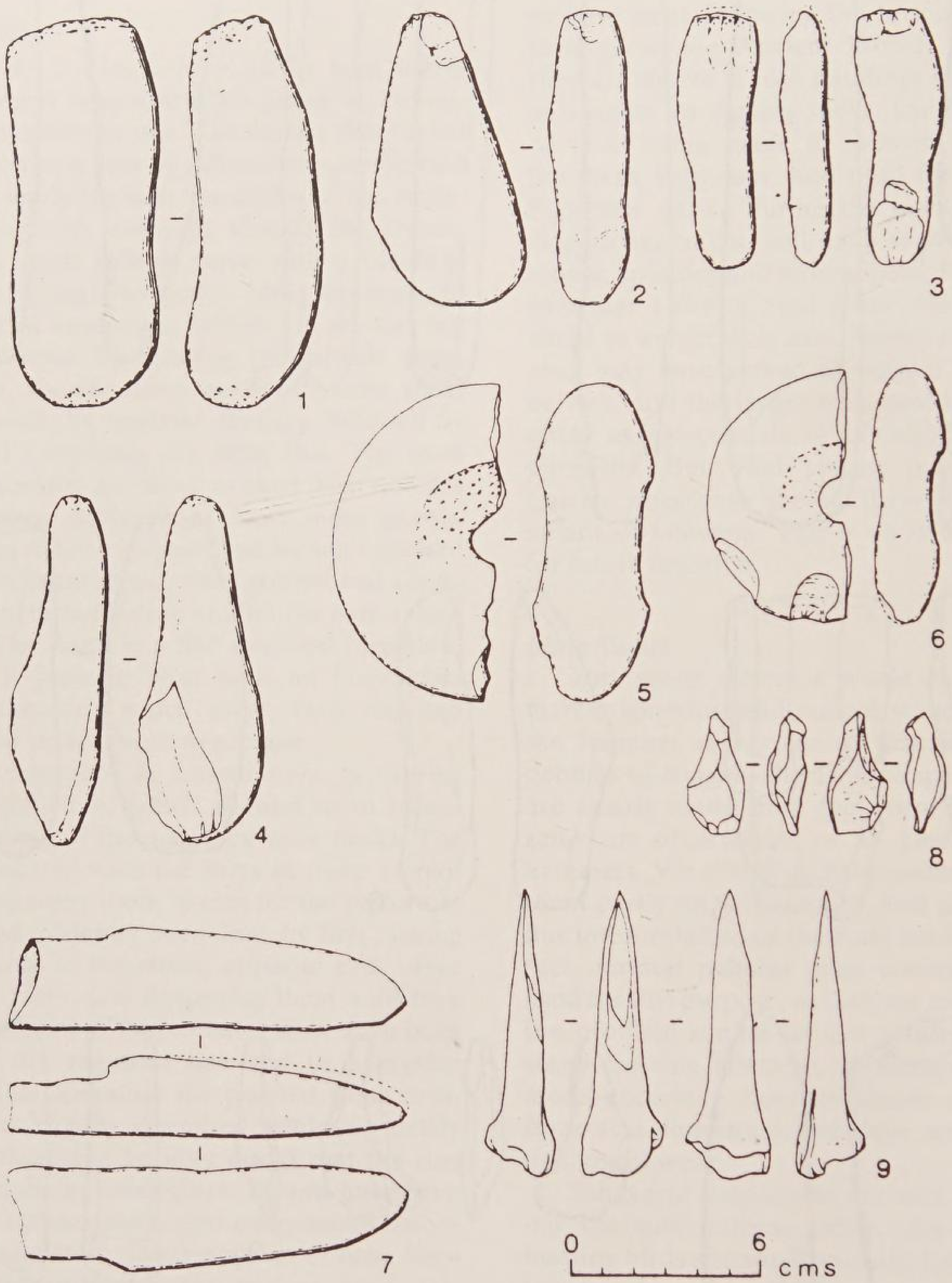

Fig. 41.16.Ground and pecked stone artefacts and bone point. 1-7 Surface collection: 1 Cyclindrical hammer stone made from a natural pebble; 2-4 Pointed stone dressing hammers, all show shattering characteristic of the group; 5 & 6 Broken ring stones, 5 ground smooth in the outside and hammered in both depressions which had met before it broke, but the perforation had not been smoothed or enlarged, 6 has had both the outer surface and perforation ground smooth, and appears to have broken in use. 7 Natural pebble lightly hammer-dressed in parts and with traces of red ochre on the surface; 8 fragment of pink and ochre coloured mottled rock from excavation; 9 bone point from excavation.

piles of sling balls of regular sizes made of clay (Marshall, 19: Wheeler, 19: Allchin, B., 19).

INTERPRETATION

What can this analysis and examination of surface collections of stone artefacts, and materials and other information from the excavations, all done in the course of one brief season's field work, tell us about this unusual site? The information considered is certainly not sufficient to reconstruct anything like a complete history of the site, nor to give a comprehensive account of the life of the community who lived there during the late fourth to third millennium B.C. However it does allow us to make certain statements about the site at that period, and the activities that went on there then, and perhaps also in earlier and later times. From these observations a number of tentative deductions can be made regarding the relationship of the Lewan community to the surrounding region, and to the wider web of economic and cultural relationship that had already bound together the greater Indus region, and established links with regions beyond its borders.

Lewan is not an isolated site: in the Bannu Basin there is a small cluster of other settlements which more or less span the same period of time. Within one mile of Lewan is Mirzali Khan Dherai, a small mound producing evidence of regular settlement, with mud brick housing, pottery and other artefacts equivalent to the late period (i.e. to Rehman Dheri, period III). Within a ten-mile radius of Lewan at least six other settlements are known, Tarakai Qila, a substantial settlement also of the later period and occupying approximately 12 hectares; Islam Chawki, a small, much damage mound with occupation of at least the middle the late periods of Lewan; Laklargai Dherai, a substantial site with a thin. deposit, also probably dating from the late period; and Dad Kala Kach Dherai, a small and very damaged site on the bank of the Lohra river, which also probably belongs the late period. Two sites have recently been discovered (Farid Khan, Knox and Thomas, 1988) within the same area, but showing ceramic evidence of a considerably earlier period of occupation than any of the former, these are Sheri Khan Tarakai and Barrai Khuarra 1. Thus by Early Harappan times these sites formed a cluster around Tarakai Qila,—the largest settlement of the group. Some thirty miles to the south, beyond the Pezu gap, lies another, larger group of somewhat more substantial sites, of which two, Gumla and Rehman Dheri have been excavated, and which, from the nature of their finds span the whole range of time represented at Lewan. Here, Rehman Dheri was notably the largest of the cluster, with an area of approximately 19 h. Thus when one thinks of trade and other connections Lewan is not at all isolated, in a local sense, but appears to be part of a network of sites and site clusters in this part of the western borders of the Indus valley.

Lewan's input to local, and perhaps regional, trade must have been chiefly in the form of stone tools. With regard to the heavy stone industry we can say that it can be divided into two major classes of artefacts. The first includes those that form fairly well defined tool types, that is to say axes, ring stones, saddle querns and rubbing stones for use with the querns. To these might perhaps be added the better finished cylindrical hammers, and the most regular spherical and cuboid hammer/sling balls, although here it is impossible to arrive at clear distinctions. These finished tools would have constituted a major element in the export trade.

The second group includes primarily jigs for making stone tools, the better defined types being stone dressing hammers, including both heavy cylindrical hammers and lighter weight pointed hammers (which, as we have seen may have been used in a similar manner to punches or cold chisels), and grinding stones. The quantity of utilized stone on the site shows clearly that most of the specific tasks for which these artefacts were used were also regularly performed with the aid of any suitable stone that happened to be avilable,—a situation that makes nonsense of any attempt at numerical analysis.

Palette stones, which have been included in the table, are similarly little more than an extension of the utilization of suitable pebbles. Their relationship to heavy stone artefact production is unclear. On balance it seems more likely that they were associated with the production of microlithic blades, etc., and/or used for other processes such as grinding up small quantities of substances for domestic or industrial purposes.

The sheer quantity of material, the marked distinction between specific end products and jigs, together with other factors pointed out above, make a strong case for Lewan being a factory site from which stone tools were exported. Whether they went to other sites in the vicinity, or were passed by trade and exchange to more distant places, or both, is an interesting question. The lack of stone of any kind in adjacent alluvial plains of the Indus, certainly indicates a potential market for stone tools. Since the fourth millennium profound changes are thought have taken place in the catchment (and consequently in the volume of water carried and perhaps the yearly inundation pattern), and also in the course of the Indus. It seems highly probable that much material, including many early settlement sites, has been swept away in the main valley, and much alluvium deposited which may have covered others up. A thorough survey of sites in the Indus valley from this point of view might provide some clues, but the problem is a difficult one to address.

The relationship of the heavy stone industry to the community at Lewan who, in the late fourth to third millennium B.C., lived in the huts and made and used the pits appears to have been a fairly close one. The fresh, unweathered heavy stone artefacts found in the excavation, which we have seen include all the types identified in the surface collection except one (axes), seem to be an integral part of the culture. We have also seen that this appears to be quite a rich culture in terms of the range of domestic animals and variety of objects it included and the quality of its pottery. Whether these objects were made at Lewan or obtained by exchange and barter is a matter for discussion, but the available evidence seems to point partly to the former and party to the latter. Whether the people whose homes we excavated, and those who possessed the fine painted pottery vessels found in one of the pits actually made the stone artefacts; whether they organized the production of heavy stone tools such as querns, and their distribution and exchange; whether they allowed others to use the site on certain terms—on the lines for example of the sort of agreements made between farmers and nomads today—are questions that future research may be able to go some way to answer. At present we can only pose these questions, and repeat that on present showing there appears to be little doubt that finished tools of certain types were exported.

A similar set of arguments apply to the microlithic blade industry as to the heavy stone industry. The quantity of material alone strongly supports the thesis that Lewan is a factory site serving other communities, even if we assume that it was in use over a period of some centuries. What we do not know is what actual communities it served. So far as we have no positive identification of artefacts from Lewan at any of the contemporary settlements in the region. Microlithic sites associated with the dunes in the western sector of the basin remain to be investigated, and there is the same lack of evidence from the Indus plains as in the case of the heavy stone tools.

Looked at from a more general point of view, there are a number of factors pointing towards wide ranging trade in stone artefacts. The indications are that between the early and late periods at Lewan important development took place, so that by the Early Harappan period the presence of a more highly organised trade network, with evidence of seals, carts, and perhaps also more permanent mud brick houses on the site, and of imported luxury materials, such as lapis lazuli, is clearly indicated. During the mature Indus period this development of trade networks reaches a new level. There is ample evidence of specialized production at certain centres. A classic example of this is of Chanhudaro, where beads and jewellery, made from imported materials, were produced on a considerable scale. Stone blades were imported in large quantities to the major cities of the Indus civilization, and were produced at the source of supply in the Rohri hills in Upper Sind, and perhaps elsewhere. As already pointed out stone sling balls were found stacked near the outside walls at both Harappa and Mohenjodaro. There is evidence for trade in luxury goods such as turquoise and lapis lazuli from much earlier times, at Mehrgarh (Jarrige, 1981: 97). Many more examples could be cited, but these are sufficient to make the point that the stone artefacts produced at Lewan in such quantity, certainly during the late fourth and third millennia B.C., and perhaps for a considerable time before and after this, were in all probability traded both locally and to the Indus plains beyond the southeastern hills.

The most important unanswered questions with regard to the history of Lewan as a factory site are those of chronology and dating. The occupation period brought to light by our excavations is the only evidence we have to go on at present. As we have seen to shows that the heavy stone industry and the microlithic industry were flourishing at that time (late fourth to third millennium B.C. The inhabitants were using artefacts made in both traditions, employing the same raw materials and techniques, and producing a similar range of artefact types those found in the surface collection, with only minor differences. As we have already pointed out, these differences might well be no more than those occurring between the domestic aspect of the craft of the one hand, and its totality (including domestic, agricultural, hunting and industrial aspects) on the other. What it does not tell us is for how long before and after this period either of these techniques was practised at the site. Surface collections like these cannot demonstrate progression and development through time, let alone provide dates. It is perfectly possible that more extensive excavations would have revealed similarly slender evidence of occupation both before and after that which we discovered. Only further and much more extensive excavation could determine this, and the amount of deflation at the site makes even this uncertain.

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M.K. DHAVALIKAR

42. Harappans in Saurashtra: The Mercantile Enterprise as Seen from Recent Excavation of Kuntasi

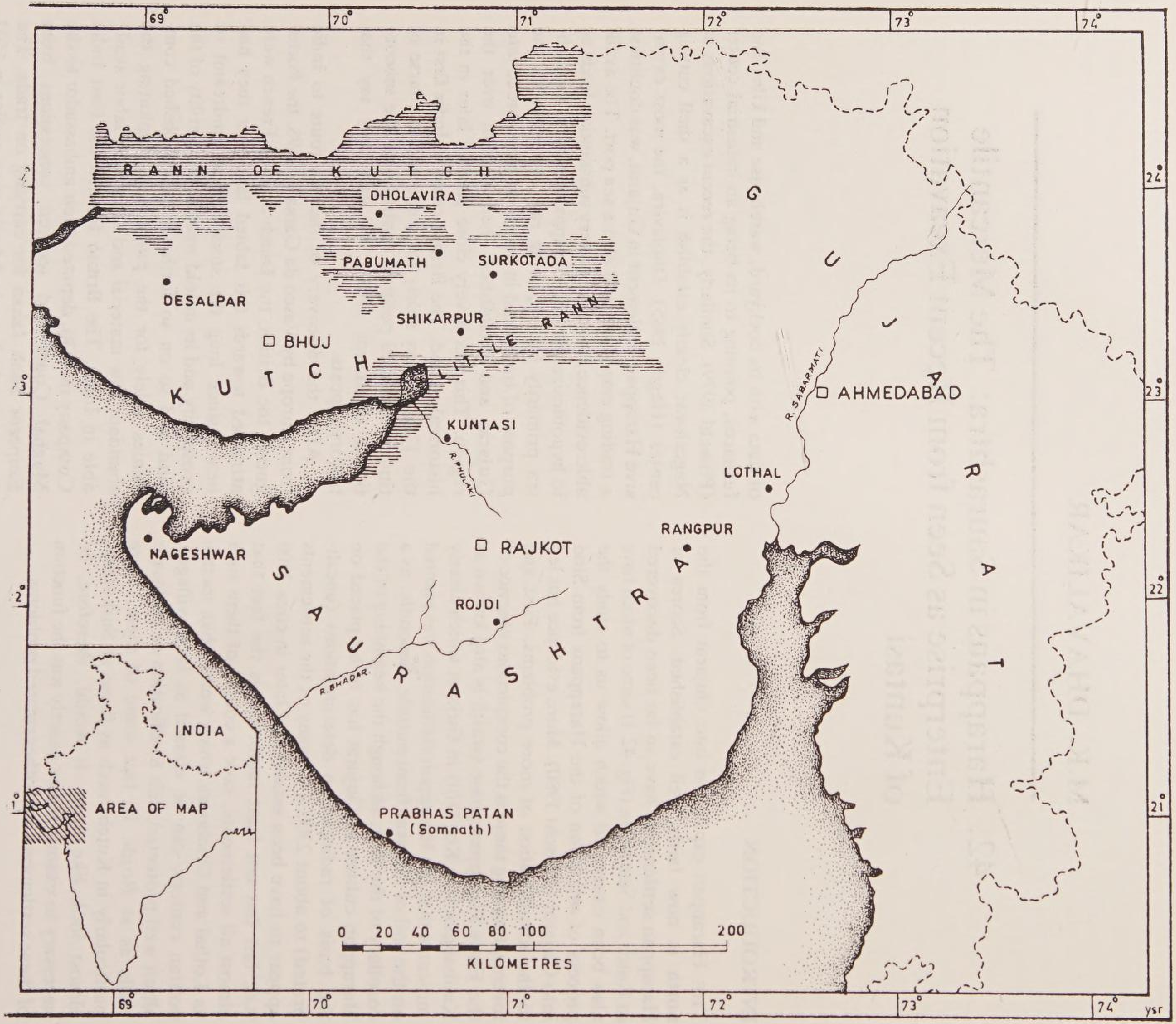
INTRODUCTION

THE Harappan expansion into Gujarat from the north is now fairly well established. Scores of Harappan settlements have so far been discovered in Kutch and Saurashtra (Fig. 42.1) some of which have also been excavated which allow us to study the process of migration of the Harappans from Sind into Gujarat (Possehl 1980). More evidence has led to the identification of more problems. First and foremost among these is the conspicuous absence of the Early Harappan phase (which is also known as Kalibangan I or Kot Diji) in Gujarat which clearly indicates that the Harappan civilization was planted on the soil of Gujarat from outside. Secondly, as a corollary of the first, although the beginning of the Harappan culture in Gujarat has to be placed on the basis of radiocarbon determinations (uncalibrated) to about 2300 B.C. many of the settlements appear to have been established later in circa 2200 B.C. last but not least important is the fact that almost all settlements, save a couple of them such as Lothal and Dholavira which were urban metropolitan centers, can be classed as large villages, albeit well protected with fortification or enclosure walls as at Rojdi. In fact some of them, more particularly in Kutch, such as those at Surkotada, almost look like forts. It would, therefore, be necessary to examine what exactly was the function of these settlements and other related problems.

The Model

The excavation at Lothal has yielded a vast mass of data with its dockyard, warehouse and kilns and furnaces, pointing to its being an industrial center (Possehl 1979). Similarly, the recent excavations at Nageshwar clearly establish it as a shell cutting center (Hegde 1985). Dholavira, the most extensive Harappan settlement in Gujarat, was doubtless a trading emporium and also a sea port. The available evidence, though not very substantial, leads us to hypothesize that the Harappans came to Saurashtra primarily for acquiring raw materials for the purpose of trade, and in course of time spread into Gujarat and established their control over the region. This has a very close parallel later in the historical period. The British came to India first in the 17th century solely for trade and in course of time established political control over the subcontinent (Kulkarni 1964). We can only say that history repeats.

After the discovery of the sea route to India from Europe by Vasco da Gama in 1498. the Portuguese, the British, the Dutch and the French were attracted towards this fabled land, for they had heard since long the stories of its undreamt of prosperity and its untold wealth, the fertility of the land and so on so forth. They established companies solely for the purpose of exploiting the abundant raw material and the cheap labor available in India. The British formed the East India Company in 1630, deputed their ambassador to the Mughal Court and secured concessions from Emperor Shah Jahan for carrying on trade. The Portuguese had reached India even earlier in 1597 with the same objective.



RANN OF KUTCH
DHOLAVIRA
PABUMATH
SURKOTADA
DESALPAR
SHIKARPUR
LITTLE RANN
BHUJ
KUTCH
KUNTASI
R. PHULAKI
NAGESHWAR
RAJKOT
ROJDI
SAURASHTRA
R. BHADAR
PRABHAS PATAN (Somnath)
GUJARAT
R. SABARMATI
AHMEDABAD
LOTHAL
RANGPUR
INDIA
AREA OF MAP
0 20 40 60 80 100 200
KILOMETRES
69°
70°
71°
72°
73°
74°
24°
23°
22°
21°
ysr

Fig. 42.1. Map showing major Harappan settlements in Kutch and Saurashtra.

The British established what are called 'factories' for the purpose of trade. The 'factory' was a structure, which was enclosed within a wall, and served as residence of the few British officers, who were in the employ of the East India Company. It was not one building but a complex of buildings containing godowns or warehouses and residential quarters for officers and even their servants. One of the earliest and the most important of the British factories was at Surat in Gujarat. In the 17th century, Surat was one of the most prosperous cities and was perhaps the largest industrial and trading center in India. It played a very important role in India's foreign trade and was also known for its domestic manufacture. In a word, Surat was the most important commercial emporium and occupied the same position as that of Bombay today (Gokhale 1979; Singh 1977). Among the articles of trade, mention should be made of indigo, spices, cloth and many other commodities which were exported from Surat. Hence, the English and the Dutch established their factories here in the first quarter of the 17th century. There is an excellent contemporary description of the English factory at Surat:

> "The English factory at Surat was as little like the Industrial Building that we know by the same name as it is possible to conceive. It was not a single structure but a congeries of buidings irregularly placed with godowns in one part and the apartments of company's factors and writers in another. Besides the personal quarters of the company's servants, there were several big, handsome and roomy chambers. There was also an oratory. The entire factory was closed by a wall. The admission into the factory from outside was through massive gates at which a guard was constantly posted" (Wright 1918 : 78).

The English factory at Surat was a Mughal government building and the emperor allotted it to the company on a rent of 60 pounds a year but the Company seldom paid the rent and the arrears of the rent were adjusted towards the repairs of the factory building (Anderson 1854 : 121). H.G. Rawlinson writes about the English factories at Surat:

> "This was one of the best houses at Surat. It was a solid two stories building, opening, in muhammadan fashion, inwards ...... Inside was a quadrangle surrounded by cloisters or verandahs. The ground floor was used of Company's trade, the rooms opening on to it, utilized as stores and godowns, presented a busy scene in the shipping season" (Rawlinson 1920: 121):

There was also a Dutch and a French factory at Surat.

The story of Harappan expansion into Gujarat may not be very different from that of the British in India. As a matter of fact it explains the process of the spread of Harappan civilization in Gujarat and enables us to place all the different pieces in the jigsaw puzzle in their proper place. This mercantile model explains why did the Harappans in the first place came to Saurashtra through Kutch, built their habitations in a particular fashion and in course of time occupied the different parts of this most fertile region in western India.

Kuntasi

It was with this model that we began our search for a modest Harapppan site which would throw some light on the issues outlined above. A nagging problem one has to face in this connection is that a vast majority of Harappan sites in Gujarat are presently under intensive cultivation, and as a consequence are considerably disturbed making a scientific excavation with due regard to stratigraphy almost impossible. Fortunately, we could come across a site which is intact, at least in its major part. The site was earlier reported as Hajnali (Taluk Morvi, District Rajkot, Gujarat), but was later found to have been situated in the revenue limits of the village Kuntasi (Taluk Maliya, District Rajkot). It was first reported by the late P.P.Pandya, an archaeologist of the former State Department of Archaeology of Saurashtra and was later thoroughly explored by Y.M. Chitalwala when he was a research scholar at Deccan College, Poona in 1972. We very much wanted to excavate the site then, but we could not do so because we were busy with the Inamgaon excavations. Hence after a successful twelve seasons' work at Inamgaon we decided to undertake excavations at Kuntasi. The two seasons' work at the site has thrown welcome light on some of the problems of the Harappan civilization in Gujarat. The present paper discusses the evidence from the excavation and its contribution to the understanding of the Harappan problem in a proper perspective.

The ancient site at Kuntasi (Lat. 22°, 45' N Long. 70°, 76' E) is located about 2.5 km southeast of the present village. It is represented by a prominent mound which rises to a height of about 7 m from the surrounding plain. It is locally known as Bibi-no-Timbo. According to the local legend, a pious woman used to live here and provide succor and shelter to the passerby. But once a traveller tried to molest her and then she vanished. Her shrine has been erected at the top of the mound which is in the form of a wall running north-south having a niche in the center containing a stone, which is the aniconic representation of the pious woman. It is this shrine which has prevented people from destroying the ancient site and it is therefore one of the very few Harappan sites in Saurashtra which has remained intact to a considerable extent.

The site is spread over an area of about 2 ha. of which the citadel mound is more or less intact whereas the remaining part on the north is presently under cultivation. It is located on the right bank of river Phulki, the source of which is in the nearby hills, about 25 km from the site, and joins the Arabian sea after traversing some 8 km. As the crow flies, the sea today is just 4 km from the site. When we explored the site thoroughly we decided to excavate it horizontally, for we thought that it might provide clues to resolve some of the problems connected with the Harappans in Gujarat, more particularly those we have enunciated earlier and we are glad to record that the evidence from our excavations is extremely interesting from this point of view. The excavation was carried out in the winter of 1987-88, 1988-89 and 1989-90. The work was jointly done by Deccan College Postgraduate Research Institute, Pune, in colloboration with the Department of Archaeology, Government of Gujarat, which is represented by M.R. Raval and Y.M. Chitalwala, respectively the Director and Superintendent of the State Department of Archaeology at Rajkot.

The site was selected for excavation not only because it was considerably intact but also because it was relatively small and hence manageable. But far more important was the fact that even from surface exploration, it was possible to make out that the settlement was divided into two parts, viz. the fortified area and the habitation outside it. The fortification wall could be made out at places distinctly as it is built of large stones which however are undressed. Kuntasi was a very small settlement, which by no stretch of imagination can be called an urban center; it can at best be classed as a small village. As a matter of fact, there is no lower town; the habitation outside the citadel is very small and flimsy, spread over an area of hardly one ha. But this is precisely the nature of most of the Harappan settlements in Kutch as is evident from such sites as Surkotada, Pabumath and others. These are all relatively small settllements which consist only of a citadel and some habitation outside it. The ancient site at Kuntasi thus conforms to the plan of Harappan settlement in Kutch, because when we come down to the heartland of Saurashtra, the Harappan sites are of a different nature; they are quite extensive and look more like agricultural settlements.

Our decision to excavate at Kuntasi was governed by that fact that the site belonged to the Kutch complex, and that it is intact to a considerable extent. But far more important was the fact that although the site is situated on the bank of Phulki, which though small is a perennial stream, the water of the river is brackish and the nearest fresh water is available today in the village about 2.5 km, from the site. It is undoubtedly enigmatic that the Harappans should have located their settlement far away from the source of sweet water. Even the wells in the vicinity of the site today contain brackish water. All this would show that it was not an agricultural settlement. More than potable water, the people wanted to be on the bank of the river. It therefore follows that the total number of people occupying the site must have been very small, and engaged in occupations other than agriculture. The discovery of an anchor stone in the course of surface explorations was indeed very significant in as much as it allowed us to identify the main function of the site as a port. The maximum cultural deposit at the site is about 7 m of which the lower 5.50 m represents Period I (the Mature Harappan phase) to be dated to circa 2200-1900 B.C., the remaining belonging to Period II, Late Harappan, assigned to circa 1900-1700 B.C. it appears that some people lived on the site in the late medieval period in the 17th-18th century as evident from the late pottery and tiles. During this period the

Muslims are said to be sailing for Haj from here. That explains the name of the village Hajnali, on the other bank of the river.

Period I

The Harappans probably entered Saurashtras about 2500 B.C. as the early radio-carbon dates for Lothal would show. During this phase 2500-2200 B.C. only a few sites like Lothal Rojdi, and Dholavira were occupied but a vast majority of Harappan sites in Saurashtra were inhabited only during the second phase datable to 2200-1900 B.C. The beginning of the Harappan settlement at Kuntasi also can be dated to circa 2200 B.C. This is evident from the occurrence of many mature forms in the painted red ware such as the S-shaped jars, pointed based jars, highly decorated step-sided dishes, short -stemmed stud-handled bowls and ledge-necked jars etc. The design repertoire consists of a range of geometric patterns as also a variety of floral motifs. Besides, there is also a bichrome ware having red and buff surface painted with black or brown.

Among other finds of Period I mention should be made of the typical cubical chert weights and terracotta toy cart frames. A few bone tools, mostly points, were found in one of the rooms in the industrial area on the west. It may be noted that pottery kilns were also found in the western complex. The bone tools therefore may have been used for executing incised designs on pottery. In sharp contrast to this, the blade tool industry is conspicuously absent; a few chert blades, however, occurred in one of the rooms in the industrial area which is quite significant. A quantity of beads of semi-precious stones such as carnelian, agate etc. were found. The most noteworthy among these are the long, tubular carnelian beads which were expoted to West Asia (Chakrabarty 1982). Besides numerous faience and steatite beads were also recovered. They were in all probability made at the site.

A most noteworthy discovery is that of a copper hoard in a small pot from one of the structures on the north (ST 50). There were a few copper bangles, over a thousand microbeads of steatite and two finger rings which are unique as they have no parallel at any other Harappan site. Of the two rings, one is broken, but the other is intact (Pl. 42.1). It has a large double spiral. It may be stated that we had found a couple of fragments of such spirals earlier, but they were taken to be the parts of the typical spiral-headed pin which has been reported from Harappan sites (Piggott 1947-48). The spiral as a motif is of rare occurrence in the Harappan context and its presence at Kuntasi cannot be without significance. The structure in which it was found was a large squarish room with a verandah on the north. It was located on the north near the entrance gateway. It is highly likely that the occupant of this structure was in charge of the security arrangements at the site. His house was located adjacent to that which has been identified as that of the chief priest, across the road (Fig. 42.2).

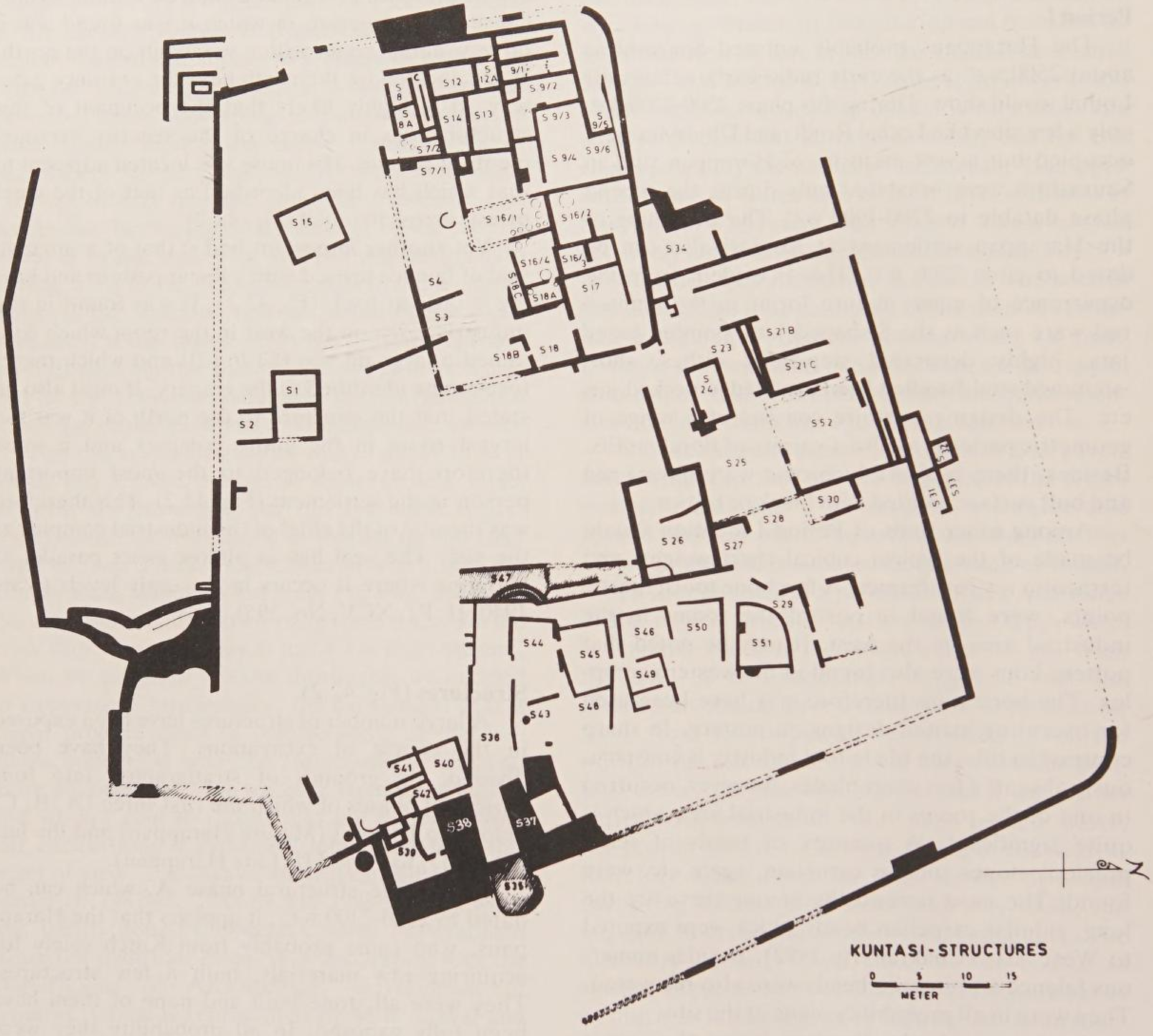
Yet another important find is that of a squarish seal of faience incised with a linear pattern and having a boss at back (Pl. 42.2). It was found in the industrial area on the west in the room which contained a large pit silo (ST26 (2)) and which therefore can be identified as the granary. It must also be stated that the structure to the north of it was the largest room in the entire complex and it must therefore have belonged to the most important person in the settlement (Fig. 42.2). This therefore was the seal of the chief of the industrial complex at the site. The seal has as almost exact parallel at Harappa where it occurs in the early levels (Vats 1940: II, P1. XCV, No. 395).

Structures (Fig. 42.2)

A large number of structures have been exposed in the course of excavations. They have been divided, on grounds of stratigraphy, into four structural phases of which the first three (A, B, C) belong to Period I (Mature Harappan) and the last (Phase D) to Period II (Late Harappan).

During the structural phase A, which can be dated to 2200-2100 B.C., it appears that the Harappans, who came probably from Kutch solely for acquiring raw marerials, built a few structures. They were all stone built and none of them have been fully exposed. In all probability they were residential structures.

The second structural phase (B) was the most important phase (c. 2100-1900 B.C.) in as much as it was the most flourishing in the history of the site. Most of the structures encountered in the course of excavation belong to this phase. After settling at the site the Harappan must have decided, in view of the abundance of raw materials in the neighbourhood of the site, that it was more profitable to pro-


S 8
C
S 12
S 12A
S 9/1
S 9/2
S 8A
S 14
S 13
S 9/3
S 9/5
S 7/2
S 9/4
S 9/6
S 7/1
S 15
S 16/1
S 16/2
S 34
S 16/4
S 16/3
S 4
S 18C
S 18A
S 17
S 3
S 18B
S 18
S 21B
S 23
S 21C
S 1
S 24
S 2
S 52
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S 31
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KUNTASI - STRUCTURES
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Fig. 42.2.

duce finished goods at the site itself instead of sending the raw materials to other industrial settlements. The entire site came to be occupied by structures during this phase. They are all built of stone rubble set in mud masonry and in some cases the walls were built of mud brick with stone foundation. The mud bricks measure 38 × 19 × 9.5 cm and thus conform to the Harappan standard. They were laid in the headers and stretchers fashion. In some places, it was observed that stone walls were covered with mud plaster. The stone used is the brittle miliolite limestone which is plentifully available in the nearby stream. There is evidence to show that sometimes the stones were roughly hewn and made flattish. Although most of the stones used are sub-angular, huge boulders were also used especially in the construction of the watch tower and the approach road of the entrance gateway and the fortification wall.

The entire settlement during the structural phase B seems to have been built on the typical *chatuhsala* plan, that is, with structures on all the four sides and having an open area in the center (Fig. 42.2). It had a double fortification wall enclosing an area roughly 125 m. sq. The width of both the walls varies from 1 m to 1.5 m. The entrance gateway (3 m wide) was provided on the east (Pl. 42.3). It was flanked by rectangular bastions. The inner fortification wall had offsets on the south of the entrance gateway and its angular projections may have served as wave breakers. This is a novel feature which has no parallel at any Harappan site. In the southwest corner was a roughly squarish watch tower (10.55×8.50 m) from which emanates the inner wall.

A narrow road leads westwards from the entrance gateway. It is flanked by spacious chambers which are interconnected. The rooms on the north side are inordinately large (8 × 4.20 m) and had a verandah at the front. The road then takes a northerly turn. The structures on the north, which have been fully exposed, may have served as residences of security guards and artisans etc. There is no evidence of any hearth or ash or charcoal in them, and it therefore appears that they had a common kitchen in ST 15.

On the north were spacious houses which were undoubtedly independent units. They seem to be very carefully planned and built. Some of them are multi-roomed. It appears that extra care was taken for their security because there were small rooms between the two defence walls on the north which may have been for security guards or watchmen. A very imposing structure was located in the eastern end of the northern part. It was very spacious (13.20 × 7.80 m) and divided into two rooms by a partition wall. The road leading from the entrance gateway towards the west takes a northerly turn and ends at this house. But the most noteworthy feature is the stone platform emanating from this house and running north-south (20.30 × 3.80 m). This platform is semi-circular in the middle reminding that at Mohenjodaro which has been numbered 15 in L area (Atre 1987: 121-22) and it is therefore tempting to identify it as a ritual structure. Equally interesting is the fact that it faces towards the open quadrangle in the center of the settlement. This cannot certainly be without significance, and we may not be far off the mark if we infer that the congregation was held in the open quadrangle with the priest-chief addressing it from the platform.

Entrance to the workshop area (Pl.IV) was also provided from this side through a long, wide passage (23 × 5 m) leading from the fortification wall and passing through the house of the chief of the workshop. This latter structure is the most imposing at Kuntasi, consisting as it does of multiple rooms, of which the front one was very spacious. Adjoining it on the south was the granary containing five large pit silos. It also had an attached kitchen which yielded a squarish faience seal identical with that from the earlier levels at Harappan which has already been referred to (Pl.V). There should be little doubt that the person occupying this house was perhaps the most important, may be the chief of the workshop and the granary.

The structure complex on the west consisted of several small and large rooms, some of them containing kilns and furnaces, storage areas and so on, clearly indicating that it was meant for manufacturing pottery, a variety of beads and possibly also copper artefacts. The structure complex had a long platform (12.50 × 3.20 m) along its western margin for loading and unloading. The structures on the south have been much damaged by the river floods, but the ramp leading to the river has survived in the southeast corner (Fig. 2).

During the structural Phase C (circa 1900-1800) some of the earlier buildings of Phase B were repaired and reused. No new structure seems to have been added during this Phase.

Period II (c. 1900-1700)

The Harappan activity begins to decline around 1900 B.C. probably because of decrease in the long distance trade with West Asia. Kuntasi was an industrial center and naturally therefore it received a setback. The Late Harappan settlement at the site is represented by structures mostly on the south. They are single or double roomed structures with their walls having single stone courses. The Late Harappan occupation at the site was rather short lived considering the thickness of the cultural debris of about 1 to 1.5 m. A small furnace of clay of this period was exposed. It is circular on plan and has a narrow opening suggesting the use of bellows. In that case it might have been used for fashioning copper artefacts.

The ceramic evidence also corroborates the short duration of the Late Harappan phase at the site. Many of the Mature Harappan forms continue to occur but the bowls now have developed everted rims, the stud of the handled bowls becomes longer and so on. There is a large proportion of plain pottery whereas the painted black-on-red has only linear designs. Black and Red ware of the Ahar culture too occurs though rarely.

The site remained unoccupied for over three and a half milennia and only a few huts were built on it in the late medieval period as is evident from the coarse gray pottery and fragments of roof tiles. This was the time when Muslims sailed for the Haj in small country craft from here. This would suggest that even in the late medieval period a riverine or creek port was located here.

It is clear that the Harappan settlement at Kuntasi had no lower town worth the name, and this site therefore appears like a fort as is the case with many other Harappan settlements such as Surkotada, Pabumath, Desalpur and so on which can better be described as military outposts of the Harappans whereas Rojdi nearby was probably an agro-pastoral settlement (Possehl and Raval 1989). But Kuntasi cannot be classed as a military station for the simple reason that we have what can be identified as workshops and storage facilities, which are conspicuously absent at Surkotada and other places. Kuntasi therefore appears more to be an industrial center for acquiring raw materials from the hinterland and producing finished goods ostensibly for exporting them to West Asia.

Kuntasi obviously was not an agricultural settlement because even the water in the river at present is brackish and not fit for human consumption. The question that then naturally arises is: Why was this site selected by the Harappans for locating their settlement? One possible explanation seems to be its proximity to sea so that it could be used as a port. The sea today is about 4 km as the crow flies but the geomorphological investigations have revealed that it may have been closer still some for thousand years ago, say about 1.5 to 2 km away. This raises the possibility of Kuntasi being a high tide port or an estuarine port. This observation, coupled with the evidence of kilns and furnaces in the fortified area lead us to conclude that Kuntasi was primarily a port and an industrial center.

Resources

There should be little doubt that the Harappans came to Saurashtra for exploiting the wealth of raw materials available there. Among these mention should be made of semiprecious stones such as carnelian, chert, agate etc. which were useful for making beads, chank shell and ivory for bangles and other ornaments. Another important raw material available around Kuntasi today is the excellent clay which was used by the Harappans for making faience beads and for making excellent pottery. Among the exquisite ceramic wares from Kuntasi the most remarkable is the bichrome ware which, though sporadic at other sites, is abundant at Kuntasi. It is highly likely that this pottery was exported along with other finished products. Another significant discovery at Kuntasi is of lapiz lazuli beads. It is significant that they should be so rare at other Harappan sites and should occur in good number at Kuntasi. In all probability the raw material may have come from Gujarat itself as suggested by Romila Thapar (1975: 10-11).

Kuntasi is thus as excellent illustration of Imannuel Wallerstein's world systems theory which, as applied to modern capitalist societies, in which peripheries supply core areas with raw materials, that cores are politically and economically dominant and that the social and economic development of all regions is constrained by the changing roles they played in the system (Kohl 1979). This would show that Saurashtra contributed considerably to the prosperity of the Harappan civilization.

The structures exposed at Kuntasi no doubt suggest that it was an industrial center if the kilns, furnaces and storage facilities are any indication. It must have been a flourishing industrial center and hence the need for a massive double defence wall. The Harappans may have brought a few of their master craftsmen with them from Sind and Punjab; they were in all probability provided accommodation inside the fortified area. The autochthons were probably employed as unskilled labor to work under the guidance of these master craftsmen. they were allowed to live outside the fortification wall where we have found traces of habitation on the north. It is likely that these autochthons got acculturated in course of time. The raw materials were probably supplied by the hunter-gatherers from surrounding areas.

Decline

Sometime in the beginning of the second millennium the decline appears to have set in as is evident from other sites in Saurashtra. The reasons put forth are manifold: ecological, economic and so on. It has been observed that the Harappan trade with West Asia began to dwindle from the Isin-Larsa period around 1900 B.C. (Ratnagar 1981). The prosperity of the Harappans which was so much dependent on this long distance trade, naturally began to wane and the period from c. 1900-1700 marks the Late Harappan phase at Kuntasi. During this period the importance of the settlement as an industrial center was coming to a close. The workshop areas were abandoned. Smaller houses of stone rubble were built, albeit within the fortified area particularly on the south. The ceramic wares do not appear to have undergone any significant change, but it is likely that among many crafts it is only the potter's that seems to have survived at Kuntasi if the highly specialized kiln of the late Harappan period is any indication (Pl.VI). The exquisite bichrome ware, which was the speciality of Kuntasi, continued to be made on a larger scale during this phase. Perhaps it was meant for the regional trading network.

The settlement was abandoned probably by c. 1700 B.C. The evidence from other Harappan sites in Saurashtra indicates that the urbanized Harappans were gradually being reduced to the rural statue. The Harappans then became village folk, merely the poor successors of the once flourishing urbanites. The region was then dotted by chalcolithic farming communities, but Kuntasi was certainly not an ideal place for farmers for the simple reason that even potable water was not available at the site. The Harappans obviously must have shifted to some neighbouring area. It may be noted that a Harappan village has been discovered at Panchasar near Morvi and even at Kuntasi itself there is a small Harappan site, about 2 km north of the village.

Evidence from Other Sites

It is now a more or less an established fact that the Harappans first came to Gujarat in circa 2300 B.C., if the evidence from Lothal is any indication, but the radiometric assays for other sites would suggest that a majority of Harappan settlements in Saurashtra are later, beginning from ca. 2200 B.C. The Harappan civilization in Saurashtra can by no means be said to be the local development (Rao 1979: 28-29). Once planted, it flourished there for some five centuries with great vigour and the decline set in around 1900 B.C. as was the case in the original home of the Harappans in Punjab, Sind and Rajasthan. The decline continued for a couple of centuries and the Late Harappans, as have been aptly described (Ghosh 1965: 123) were mere jejune shadows of their prosperous forebears.

When we consider the Harappan problem in Gujarat, the first and foremost question that arises is: why did the Harappans come to Gujarat in the first place? The pre-Harappans and the Early Harappans were flourishing in the north-western parts of the subcontinent for several centuries in the third millennium and even earlier, but these were mostly self-sufficient communities, some of them autonomous and some probably organized into chiefdoms; they do not seem to have spread beyond the Indus, its tributaries and the Saraswati-Drishadvati valley. Centers like Dholavira and Lothal were among the first to be established in Gujarat. Later, during the time of Sargon of Akkad there was a tremendous spurt in the demand for oriental luxuries in ca. 2300 B.C. (Ratnagar 1981: 202). This was the time when a vast majority of

Harappan settlements in Saurashtra were established. Hence the most prosperous period of the Harappan occupation in Gujarat, as in the original home, was from 2200-1900 B.C. There was a great movement of men and materials during this period and it therefore became necessary for the authorities to build military outposts like that at Surkotada. What is more, even smaller settlements such as Kuntasi had to be fortified properity to protect the merchant—traders and the master craftsmen from the autochthons hunter-gatherers and incipient agriculturists.

The Mesopotamian documents testify to the trade with Meluhha which has been rightly identified with India, more particularly Gujarat for the simple reason that the articles imported from Meluhha are available mostly in Gujarat. The beginning of this trade in Mesopotamia goes back to about 2600 B.C. (Ratnagar 1981: 200). We have already seen that the radiocarbon dates show that the antiquity of the Harappan Civilization in Gujarat has to be assigned to circa 2200 B.C.. This date, however, is uncalibrated and we may not therefore be far off the mark if we push back the initial date of Harappan entry into Gujarat to 2500 B.C. The Harappans were traders *par excellence* and when they realized that there was a growing market in Mesopotamia for Indian luxuries such as carnelian and lapis beads, shell, ivory, etc., they soon started coming to Gujarat around 2200 B.C. for acquiring these raw materials, processing them into finished goods and exporting them to West Asia by sea. The calibrated dates for this phase are in the range of c. 2500-2300 B.C. (Possehl and Raval 1989: 10-11).

A casual glance at the distribution of Mature Harappan settlements in Kutch and Saurashtra will show that they are not only far and few between but in a way mark the route of the Harappan migration into western India (Fig. 42.1). They were mostly located on the coast and among these mention should be made of Lothal, Dholavira, Pabumath, Desalpur, Khirasra, Kuntasi, Shikarpur, Nageshwar and Nagwada. Even the *Ranns*—the great and the small—are said to be forming an arm of the sea in the latter half of the third millennium when the Harappans flourished in western India. This observation is further strengthened by the hydrological studies which suggest that the *Ranns* were under a 4 m sheet of water during the Harappan times (Gupta 1977). A few sites in Kutch like Surkotada, Desalpur, Pabumath and Khirasra, which were strongly fortified, were undoubtedly military outposts for affording shelter and protection to the Harappan merchants and traders on their way to Saurashtra.

Some of these settlements such as Kuntasi and Nageshwar have proved on excavation to be industrial centers specially meant for procuring raw materials from the hinterland and for producing finished articles. Nageshwar was an important center of chank shell industry (Hegde 1985; Kennoyer 1984) and Kuntasi for making pottery and faience and other beads of semi-precious stones. The former settlement was situated on the coast obviously for procuring chank shell. Around Kuntasi today there are over 150 factories manufacturing tiles and quite a few ceramic industries. This, in the main, is due to the availability of clay of extremely fine quality which, as at present, must have attracted the attention of the Harappans. It was obviously this clay which was used by the Harappans for making their exquisite red ware as also the bichrome ware which occurs sporadically at other sites in Saurashtra but in profusion at Kuntasi. Moreover, it is this clay which was used for making beads of faience, The addition of cobalt lends a lovely bluish tinge to the bead. These beads have been found in good quantity in the course of excavations at Kuntasi along with kilns and furnaces.

When we examine the evidence from the excavations of Harappan sites in Saurashtra we are disappointed to a considerable extent for the simple reason that almost all the sites, with the solitary exception of Lothal and Rojdi, were excavated on a small scale. And what is more, all of them except Lothal and Rojdi, have remained unpublished. The only saving grace is brief reports that have appeared annually in the *Indian Archaeology—A Review*, and a few articles. However, it is these scraps of evidence which enable us to a certain extent to visualize the nature of Harappan settlements in Saurashtra. They present an altogether different picture than that in other areas of the Harappan civilization. It is the functional aspect of the sites that is most noteworthy. Of the sites excavated in Kutch, Pabumath and Desalpur were small digs conducted just to ascertain their potentiality whereas Surkotada was excavated for two successive seasons in the course of which a massive structure complex was uncovered. In Saurashtra, Rojdi is the only site which was excavated horizontally (Possehl and Raval 1989). Lothal, of course, still remains the most important Harappan settlement in Western India (Rao 1979, 1985). Our own excavation at Kuntasi is of crucial importance from the standpoint of the present study.

The excavations at Surkotada, though limited to two seasons, have laid bare a major part of the settlement (Joshi 1972). The settlement was nothing but a strong citadel built of stone rubble. It is divided into two parts, one of which was the citadel and the other, the residential area, both of 60 sq. m. each, with square bastions at the corner and in the center of the longer sides. It is a typical Kutch Harappan settlement which looks like a garrison settlement for providing shelter and security to the Harappan traders coming from Sind and Punjab on their way to Saurashtra.

Desalpur too is one of the key sites and though excavated on a small scale, it must have been a military outpost like Surkotada. The excavation revealed a fortified complex with a residential subpart but there was no city complex in the lower town. The rectangular pattern of the citadel complex, which has been compared with that at Sutkagen–dor in Baluchistan (Soundararajan 1984: 219), is built of rubble or partly chiselled stones. K.V. Soundararajan rightly observes : "Desalpur and Surkotada are not typical Harappan villages or town sites, but more in the category of depots or cantonments or outposts where no regular village community exists but only men on duty with a specific role to fulfill" (Soundararajan 1984:222).

Yet another site is Pabumath which was excavated on a small scale by Y.M. Chitalwala (1982). It is located on the margin of the *Rann,* 20 km from Dholavira. The structure complex unearthed in the course of excavation is built of stone rubble and the existence of a fortified settlement cannot be ruled out. The occurrence of marine fish at the site is significant.

Shikarpur is very strategically located at the junction of Kutch and Saurashtra on the coast. It is a 'U' shaped mound, spread over an area of 240 – 210 m; but appears to be very poor as the excavation would show (Raval : pers. comm.). A few mud and mudbrick structures have turned up and the pottery is extremely coarse. It is not unlikely that it was a small port, and moreover, a fishing village. Nagawada is also in Kutch, and the excavator has reported even pre-Harappan occupation of which only a single burial has been encountered (Hegde: pers. comm.). Here also the structures are of mudbrick. But the work at both these Kutch sites is in progress and nothing more can be said.

Just as the Kutch sites were military outposts, some of the Saurashtra sites were industrial centers and their main function undoubtedly was acquiring raw materials and turning them into finished goods for export to West Asia and also to Sind, Punjab and Rajasthan. The evidence from Kuntasi bears this out in ample measure.

Lothal was the most important industrial center of the Harappans in Saurashtra. It was very carefully planned and the excavation has yielded a wide variety of raw materials, finished products and objects in various stages of manufacture as also industrial waste. All these, coupled with evidence of kilns and furnaces, tools and implements, point to the site being a manufacturing center. This together with their warehouse and dockyard, bring into sharp focus the role of Lothal in Harappan trade (Rao 1979, 1985). The township was planned with great care with an eye on economy of space. This may perhaps be due to the small area of 7.5 ha in which it was located. Gregory L. Possehl observes:

> "There appear to have been areas for a rather wide range of specialized and semi-specialized activities each of which was performed in its own place. The haphazardness associated with settlements which grow by accretion is, if judged by the excavated areas, not part of this plan. The order which comes from the application of the maxim "a place for everything and everything in its place" is far truer for Lothal than anything else." (Possehl 1980: 72).

Lothal was undoubtedly a manufacturing center, but does not seem to have the necessary resources in its environs which had to be brought from distances. It was thus at the hub of a complex exchange network (Possehl 1980 : 72-73).

The Harappan settlements in Saurashtra and Kutch do not directly conform to the Harappan pattern so far as town planning is concerned. First and foremost is the fact that almost all the sites, save Lothal and Dholavira, were rural settlements. Even Kuntasi was only a village, although fortified.

Settlements in Kutch were military outposts. It is ridiculous to call the habitation at these sites outside the fortified area as "lower town" for the simple reason that it is confined to a very small area; it is hardly 2 hectares in the case of Surkotada and Kuntasi whereas Rojdi has no habitation outside the fortification wall. These places remind us of the forts that were established by the British in the northwestern parts of the subcontinent which were just military outposts; their main function was to maintain law and order and facilitate communication in a very difficult terrain. We may not be far off the mark if we infer that perhaps the same function was performed by these fortified Harappan settlements. One can very well understand that large, prosperous settlements should be fortified but it is not known why even smaller ones were fortified and were provided with a watch tower as in the case of Kuntasi. Using the same historical analogy, we can aver that it was to protect the Harappans from the hostile population of hunter-gatherers in the area surrounding these habitations. They were obviously far less numerically, if the number and average size of Harappan settlements in Saurashtra is any indication. Much of the country at that time was occupied by Mesolithic, microlith-using hunter-gatherers (Leshnik 1968). The Harappans had to live among these hostile groups, but they had to befriend them and muster their services for acquiring raw materials and forest produce. They lived with the local people in a symbiotic relationship and in the process the latter were acculturated in course of time.

The Harappans in all likelihood brought their craftsmen with them for serving them and also for training the local people. The astonishing uniformity in the typology of artefact assemblages between those from the homeland and the once produced in Saurashtra points out in this direction. The fossil forms in pottery, the beads and chert weights are all unmistakably Harappan. The Harappan craftsmen lived in the citadel and worked there. This is suggested by the location of kilns and furnaces inside the fortified area at Kuntasi. The local people who were trained in different arts and crafts were probably living outside the fortified area. They may have been hired by the Harappans, but being extremely poor their living conditions must have been miserable. The habitation outside the fortified area at Kuntasi was very flimsy though it occupied an area almost equal to that of the citadel (about 1 ha). Here it was almost impossible to trace houses; there were no floors, nor even post-holes making a sensible plan; the people probably lived in small, temporary huts. They used the typical Harappan pottery, but there were hardly any other artefacts worth the name. This clearly demonstrates the economic conditions of the occupants and we may not therefore be far off the mark if we infer that they provided the labor that the Harappans living in the citadel required.

CONCLUSION

The foregoing analysis of the evidence from Kuntasi and a re-examination of that from other Harappan sites in Saurashtra and Kutch brings into sharp focus the nature of Harappan activity in western India in the latter half of the third millennium. There is evidence to suggest that Early Harappans had some trading contact with West Asia in the first half of the third millennium which was probably mainly confined to agricultural products (Asthana 1985). But sometime about 2300 B.C., the enterprising Harappans found that there was also a sizable demand foı other luxury items such as carnelian beads, ivory, copper, lapis lazuli, shell, and so on. Most of this raw material was abundant in western India. The obvious course for the Harappan entrepreneurs was to travel to Saurashtra to procure the raw material and process it into finished products for export. The west coast also offered harboring facilities which gave a fillip to sea trade.

The Harappan migration into Saurashtra through Kutch began around 2400 B.C., on a small scale and increased after 2200 B.C., Perhaps the earliest settlements in Kutch were Desalpur in the northwest and Surkotada in the northeast. Both have yielded Mature Harappan material and the occurrence of 'Reserve Slip' ware is an indication of the early date. Dholavira, the largest settlement in Kutch, is now being subjected to scientific excavation, but there is every possibility of its being a port, and considering its size (1 sq km), there is very little doubt that it must have been the entrepot for Harappan traders and craftsmen coming from Sind. Its citadel and massive fortification walls are very impressive. So is the case with Surkotada which looks almost like a fort. The Harappans lived in well protected settlements whereas the local labor lived outside. In consequence the local people were acculturated and became Harappan gradually. The industrial activity was carried out inside the citadel area. In a word, the Harappans resemble the Europeans who came to India in the 17th century for trade. The only difference was that the latter acquired finished goods from Indians whereas the Harappans had to acquire raw materials and process them into finished articles. Both needed protection from the local people and hence built fortified settlements. It is these settlements —the citadels—which we see in Kutch and Saurashtra.

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PART VII

CONCLUSION

ROBERT H. DYSON, JR.

43 . Paradigm Changes in the Study of the Indus Civilization

THE papers included in this volume, and the extended discussions which surrounded them at the seminar, provided a rich and rewarding experience to a scholar of Iranian archaeology looking in from the perspective of that distant country. As an outsider, it may, then, be of some use to record here some impressions drawn from the papers presented and from notes on the conference relating to major changes taking place in the paradigms governing the subject. I hope I may be excused for the brevity of my remarks, but I also hope that they may serve to focus further discussion on the issues raised.

The foregoing papers point to four major conclusions:

1) That until recently progress in the interpretation of new data and the formulation of research strategies has been seriously handicapped by the persistence of certain traditional paradigms of thought which can and must now be set aside;

2) That the entire process surrounding the rise and decline of the Indus Civilization involves vastly more complex cultural dynamics than anyone suspected even a short while ago;

3) That the lack of agreed-upon criteria for basic terminology in this area has led to considerable confusion in the use of terms due to the fact that the same term is sometimes employed as a cultural or ethnic label and at other times as a period designation; and

4) That there is great need for coordinated research employing new methods and standardized concepts over larger geographic areas with the cooperation of a variety of disciplines in the natural sciences. Let us examine these points further.

I. THE STATE OF TRADITIONAL PARADIGMS

The specific paradigms which defined the study of Indus Civilization in the earlier years, and which must now be abandoned, include the concepts of: (a) a sudden and late origin, (b) a long period of widespread and static cultural uniformity, (c) a sudden and uniform collapse (Piggott 1950) caused by (d) an invasion of the Indo-Aryans (with an assumed 2nd millennium date). These paradigms were built initially on a limited data base which lacked a detailed stratigraphic or quantitative analysis of material at key sites. Little information on the variation in ecological setting was available and almost no data on the Pre- and Post-Harappan occupations were in hand. Furthermore, the geographic area explored was then limited largely to Sind and the Punjab and chronological control was lacking for much of the material in the border area (e.g. Dales 1965). Thus the superstructure of interpretation was necessarily one which was largely speculative.

Recent field work and new laboratory studies as reflected in the papers show a vast chronological and geographic expansion of the available data base. This new work and the shift in paradigms which it entails must be seen also in the light of a larger intellectual shift (J.G. Shaffer in this volume) which has taken place at mid-century. The philosophical approach based on the type-fossil classificatory concepts of the seventeenth-through-nineteenth centuries as applied in archaeology (as *type* artifacts, *type* sites, *type* cultures, etc.) and which used qualitative presence/

absence measurements as a primary methodological approach has largely been replaced by concepts evolved in the first half of the present century based on population genetics (biology) and statistical probability (physics). In particular, these fields have introduced the concept of ranges of variability and the application of quantitative methods to the analysis of data and the description of cultural dynamics (Adams 1968). This major shift, greatly facilitated by the institutionalization of archaeology in universities, has led to an interest in variability in site content and artifact classification, systems of settlements and the variability in their ecological setting, and degree, direction and rate of change in cultural phenomena. The members of the conference represented a wide range of generations and experience and found themselves on different sides of these larger and smaller paradigms. Given the rich mix of personal backgrounds combined with the wide range of problem orientation, the complexity of the data, and the range of methods of excavation and recording, the participants showed a remarkable tolerance for divergent views with their sometimes pointed exchanges, which were nevertheless, marked by a sense of humor. Their papers, as presented in this volume, represent an extraordinary documentation for this transitional stage of changing paradigms.

a) A Sudden and Late Origin

One of the first of the older paradigms to disintegrate under the impact of recent research is the concept of a relatively late introduction of agriculture into the Indus Valley and hence of a rather short period for the development of the autochthonous cultures from which the classic Harappan arose. M.R. Mughal (1970) had already proposed that in the "Early Harappan" that "widespread cultural phenomena had already set a permanent and uniform pattern of essential elements." Shaffer, however, points out that even so, the exact relation of the Amri, Kot Diji, and Sothi Cultures to the crystalization of the classic Harappan remains to be explained.

Jean-Francois Jarrige's presentation of the discoveries at Mehrgarh, which document the introduction of a subsistence economy to the valley well before 5000 B.C., dramatically lengthens the time involved in this process and casts the whole problem of Indus origins in a new light. Jarrige suggests that the foundations of the later development go back to the Neolithic and the appearance of cereal cultivation. Kenneth Kennedy points out that the available human skeletal evidence suggests a stable population in the northwest continent for several millennia prior to the Harappan period. Already in the sixth and fifth millennia craft specialization and the beginnings of long distance trade are indicated (turquoise, lapis, sea shells). The needs of agriculture are seen as causing the movement of people as their numbers increased into alluvial areas where a base of wealth (surplus grain) was gradually built up leading to exchange networks reaching out to people in neighboring areas and beyond. By the fourth millennium at Mehrgarh mass production already is in evidence for pottery and objects of lapis, turquoise, steatite, shell, and copper. By about 3300 B.C. mass production of terracotta figurines was underway. Thus the basic pattern of craft specialization precedes the "Harappan" periods. The future focus of attention, therefore, must shift from the concept of sudden origins to a study of a long and complex background and to an examination of the degree of regional variation evidenced in the process of cultural adaptation to new environments as these cultural patterns spread through the area.

b) A Long Period of Widespread and Static Cultural Uniformity in the Mature Harappan

Although the majority of the papers deal with the problems of the Post-Urban Phase of the Harappan Culture, these discussions repeatedly underline the difficulty of discussing the nature of the devolution and adaptations of the "Late Harappan" in the absence of a fundamental agreement on, and adequate analytical description of, the Mature Harappan of the Urban Phase itself. Here we run first into basic problems of description and, thereafter, into problems of inference and interpretation. In this respect another paradigm of earlier thinking is clearly seen to be in a state of collapse: the concept of cultural uniformity through the Mature Harappan Period.

The introduction of quantitative data gives different weight to evidence formerly described only on a present/absent basis in support of the assumed unchanging nature of the Harappan Culture. Within Mohenjodaro itself G. F. Dales has re-examined the ceramic sequence in the light of the stratified sample produced by his recent field work and the proposition of a static culture does not stand up. Similarly, quantitative differences between the ceramics of different sites suggest the inadequacy of the homogeneous mode. This is particularly true, as pointed out by Shaffer, when the total ceramic inventory is examined as opposed to the painted pottery only. Shaffer points out at Allahdino that the distinctive Harappan Black-on-Red Ware was restricted to specific vessel shapes and sizes and constituted less than one percent of all pottery found. He suggests that factors governing the use of such pottery and its distribution were distinct from those affecting other types. A study of regional patterns of this kind would no doubt be most instructive in ways not yet considered. That similar results might be obtained for other artifact categories has already been indicated by Marcia Fentress's (1976) comparative study of Mohenjodaro and Harappa. Shaffer hypothesizes that the similarities were maintained by an internal trading network. Some testing of these aspects of trading activities through the use of trace element analysis would be most valuable. Y. D. Sharma, working with pottery at Ropar and Kotla Nihang also argues that the Mature Harappan has different forms representing regional groupings.

The geographical location of sites of the Mature Period in terms of key ecological factors is also undermining this paradigm, as reflected by changes in agricultural crops and subsistence patterns. As the limits of known Harappan settlements have been defined over an ever wider area, very distinctive environments have been included. The significance of this variation is now beginning to be intensively studied in terms of cereal crops (Vishnu-Mittre and R. Savithri) which reflect basic differences in the subsistence patterns between the major sites: wheat and barley at Mohenjodaro, Chanhudaro and Harappa; barley at Kalibangan; and rice and millet at Rangpur, and Surkotada.

That these crops played a major role in cultural dynamics is indicated by the fact that the number of sites in Saurashtra increased from 18 to 120 in the early second millennium B.C. during Rangpur II B and C times and the subsistence base changed from *rabi* to *kharif* crops; although for some reason this increase in the number of settlements did not continue into the Rangpur III period.

A second key factor influenced by geographical location which undermines the paradigm of homogenity is the nature of trading activities which are reflected primarily by imported raw materials and occasionally by exported items such as the long-barrel cylindrical carnelian beads found in Mesopotamia (D.K. Chakrabarti). This long-distance commerce now appears to be quite different for areas involved in sea trade (southwest Sind and the western Gulf) and overland trade (Baluchistan, Punjab, etc.) as discussed by B.K. Thapar and Shashi Asthana. It is also reflected in detail in the differences between material present at Harappa and Mohenjodaro as discussed by Fentress at the conference and in 1976. Shereen Ratnagar suggests that woods such as deodar, pine and elm may well have been important trade items at Harappa which, in view of its relative isolation from any adjacent clustering of village sites, may have functioned as a "gateway city" in relation to trade.

The non-homogeneous nature of the Mature Harappan Period is indicated by cultural elements other than ceramics. Fentress' study of artifact groups at Mohenjodaro and Harappa indicate important differences as do the major architectural elements. For example, altars appear to be absent at these two sites while present at Lothal (S. R. Rao) and Kalibangan (B. B. Lal). The ritual bathing evidenced at Mohenjodaro and to a lesser extent at Lothal may well be absent at Harappa and Kalibangan. In A. Ghosh's opinion "a uniform set of Harappan religious beliefs and practices is, therefore, difficult to envisage." It is noted that even the way in which baked bricks were used varied from site to site, a fact which indicates the need to look beneath the simple presence or absence of traits to their functional context.

Variations within and between sites of the Mature Harappan is also indicated by some of the available evidence on funerary practices. Kennedy points out that the Harappan skeletal series is aberrant when compared with other such series for which archaeological data suggest a significant development of social stratification. He raises the question of whether or not social control was exercised by the Harappan elite in such a way so as not to evoke the usual dietary stress on ordinary people often imposed elsewhere. In respect to this question it is interesting to recall the fact that metal tools, which were mainly utilized for daily activities, were found widely distributed in both the large urban centers and the small sites like Allahdino (Shaffer) and were not concentrated in special situations and rarely occurred in graves. This distribution pattern indicates that metal was widely available to the inhabitants and was not a monopoly of any one group or institution, a fact which Shaffer points out and which indicates that we are dealing with a qualitatively different social organization when compared to the Mesopotamian urban centers of the same period.

At Kalibangan the cemetery yields abundant evidence for heterogeneous funerary practices with mutually exclusive areas devoted to extended inhumation burials (with very poor furnishings) and pot burials in circular pits (A. K. Sharma). In both cases the burial may have been associated with offering pits containing pottery which were gradually filled with silt. Social differentiation or even ethnic differences may be indicated by this evidence. The variance in funerary practice is compounded further through the presence of a plaster-lined brick tomb containing over 70 pots and a body placed on a layer of platters. Elsewhere in the cemetery a grave with a lidded earthen casket containing the deciduous molars of a child was accompanied by three skulls and finger bones. The contrast between the Kalibangan evidence, indicating as it does important status differences within the community, and the dietary evidence reflected in the skeletons at Harappa, which suggest just the opposite insofar as food consumption is concerned, opens up a whole field for future study and analysis.

With increasing survey activity, the overall geographic extent of the Mature Harappan has been expanded. This has important implications for the paradigm of homogeneity. It is now recognized that several types of sites exist which include a hierarchy of size as well as differential functions in relation to social organization, trade and colonization. It has, at long last, also been recognized that these sites form systems and subsystems which must be understood as such, rather than being studied in isolation.

The types of sites clearly differ—some are indigenous metropolitan centers with a surrounding hinterland of smaller towns and villages, some have specialized functions as port towns or trading outposts, and still others represent colonial settlements in new areas. Most of these specialized sites seem to have a commercial orientation and lie along trade routes. Ratnagar, as already mentioned, has suggested that Harappa functioned as a gateway city for trade from the northeast, while Asthana points out that some towns seem to be production centers and others are distribution points. Y. D. Sharma believes that many of the smaller sites were villages which supported the urban Harappan centers while other groups formed separate rural areas. Agrawal takes a different view when he argues that most of the sites were probably towns rather than villages and did not produce their own food. He points out that agriculture was based largely on cover and meander flood plains of the Indus. These shifted frequently, making fixed village life difficult. The full discussion of this question suffers from the general lack of horizontal excavation at small sites; an exception is Allahdino which sheds important light on one such smaller settlement. Shaffer points out that almost every major artifact category of the Mature Harappan is present at this small site but there is virtually no evidence for their manufacture there. This situation indicates the importance of working out distribution networks by plotting out controlled isotopic or other spatial distribution analyses of items with identifiable characteristics. Quantitative data on their occurrence can do much to demonstrate centers of manufacturing and related trading zones.

At the core of the discussion of the homogeneous nature of the settlements is the speculation and argument over the nature and role of Mohenjodaro itself. Since the site may be five times larger than Harappa and has its own unique features, it is not representative of more numerous small sites. The very size of Mohenjodaro demonstrates its power of attraction for the population while the scale of the structures there reflects the availability of sufficient wealth for investment in the labor and materials to build them. It is the presence of such wealth, and its management, which essentially sets off the major cities from the small towns and villages. S.P. Gupta argues that such urbanism "is the product of material prosperity regulated by political authority through its control over economic channels and organs of corporate life, such as guilds of professionals and municipalities." W. A. Fairservis suggests that Mohenjodaro was almost purely a ceremonial center without trade as an important influence in its location and upkeep. Ghosh disagrees. D. V. Soundara Rajan argues that the organization of the city with a citadel reflects the presence not of a civic or community administration of the people, but rather the presence of a center of management and control (the "Citadel") for the benefit of the "Citadel people". The latter are described as "a stringent centralized oligarchy; which had invented a disciplined civil model, with a consumer policy for drawing the agricultural surplus of the villages. The so-called standardization of the structures, pottery, and antiquities of the Harappan culture may essentially be an index of the *vogues* created by craft guilds of the city states." Shaffer argues that the functional division of the city, including its walled citadel, is probably a key to understanding its organization. Both he and Jansen (1979) question the degree of reality of the so-called "grid system" of streets although they accept the fact that the streets which existed in this period were broad and open, which was not the case during later phases of the city's occupation.

Thus, although the study and analysis of the hinterland with its many small sites is essential to a full clarification of how Harappan civilization functioned, by itself it is not sufficient to that explanation. Mohenjodaro is so unique that it cannot be ignored in any real explanation of the mechanism that created and maintained that degree of cultural homogeneity which did exist in Harappan sites, any more than the existence of Delhi can be ignored in understanding modern India.

Two additional elements have now been made visible, and they change the traditional concept of a static and homogeneous mature phase. The first is the addition of an exceptionally large and previously unknown settlement area on the Hakra River, as revealed by Mughal's survey. The second is the identification of colonial sites where Mature Harappan control was superimposed over a variety of local indigenous, non-Harappan cultures (as at Kalibangan, Kot Diji, Gumla, Bala Kot, etc.). Two fortified sites, Surkotada and Sutkagendor appear to be military outposts. If this identification is correct, they imply (1) The existence of a military organization of some kind, and (2) that expansion into the border areas was not necessarily peaceful. B. Allchin, senses something like this when she notes the sudden control of other sites, and the presence of walled compounds; she argues that the extent of the area and the degree of homogeneity present in the Mature Harappan Period required effective administrative political control with military authority to maintain and defend it. Sankalia (1977) has already questioned the implications of the presence of quantities of baked clay sling pellets in the large and small sites of the Mature Harappan in comparison to their rare occurrence in earlier or later contexts. It would appear that the careful study of the border areas may provide more useful data on the question of military practices than the nuclear area. Certainly the colonial expansion already underway in the later stages of the Mature Harappan, combined with the abandonment of the Hakra River settlement system, had a profound impact on the whole Harappan world. The understanding of the resulting changes in the balance of the whole system, the chronology of these events, and the rate and nature of the cultural changes induced, present a major challenge to future scholarship.

c) A Sudden and Uniform Collapse

Another major paradigm that has been destroyed is the theory of an abrupt and catastrophic destruction of the civilization. The field evidence now shows that the decline was irregular, covered a long period of time, and was caused by different factors in different areas. These factors included changes in coastlines, the drying up of river beds, the mismanagement of resources (salinity of fields, deforestation, etc.), and possibly malaria and disease (Vishnu-Mittre, Fairservis, Kennedy). Thus the causes can be seen as due to climate, tectonics, and man (D. P. Agrawal). Climatic shifts were probably important as major factors only in the local, marginal areas. The major shift of population due to the drying of the Hakra (Mughal) is certainly of crucial importance.

To these explanations may be added evidence for the decay of administrative structures (R. N. Mehta) or the appearance of social disunity (Gupta). It was generally agreed that if the administrative structure was disrupted for whatever reason—social or ecological—the surplus wealth supporting the network of long distance trade would have declined, and esoteric imported materials would have disappeared. This effect would also have occurred if effective police safety along the trade routes had ended due to administrative failure. The rate of such change could have been very rapid—easily within two generations (50 years) as may be seen historically in the abandonment of many capital cities (Mehta). When such events occur (as Gupta points out) oral traditions are apt to carry through the following "dark age."

The general thesis expressed by the papers appears to endorse the concept that the basic subsistence skills and crafts, which had been present all along at the village level and in both central and peripheral areas, simply once again became the norm while luxury items, civic amenities and administrative structures gradually disappeared. B. Allchin suggested that religious practitioners probably survived along with popular traditions involving sacred places, myths, and symbols much like Europe in the Middle Ages. In some areas these surviving patterns are the peasant aspect of former urban systems; in others they are the coexisting non-urban and non-Harappan cultures some of which began in the Pre-Harappan Period and which persisted well into the Post-Harappan Period.

Although it is true, as Dales has noted, that in the final levels of Mohenjodaro that city had become an urban slum, it is now apparent that a process of cultural transformation or readjustment was taking place which involved the shifting of the settlement areas and adaptation to new ecological conditions. In general this movement seems to have been toward the east and south. Border sites which flourished in Baluchistan and Afghanistan ceased to exist. In the Punjab-Haryana area there was a gradual resettlement toward the east (J.P. Joshi and Madhu Bala; K.N. Dikshit). Rao discovered new Harappan sites without antecedents in western central India east of the nuclear area, indicating a population shift. Y.M. Chitawala (1977) has pointed out that with the degeneration of the cultural pattern in Lothal II and Rangpur II B people seem to have moved into Saurashtra to smaller sites, some on higher ground. This population was small in numbers and may be refugee settlers rather than colonial conquerors since there is no evidence that they imposed themselves on other local people. This situation is thus different from that described by Lamberg-Karlovsky for Central Iran. Ghosh refers to an "impoverished" Harappan in the Godavari Valley. In the Punjab, Haryana and western Uttar Pradesh some old settlements continued but there were also new sites and shifts in settlement areas (Bhan and Shaffer 1978).

A significant population may have moved east from the Hakra area into Haryana and Uttar Pradesh since the number of sites in this region goes up from two or three in the Mature Harappan to sixty or more afterwards. While Harappa and Kalibangan were abandoned (Gupta suggests perhaps due to overgrazing in the area), some sites in the lower Indus continued in spite of the so-called floods (e.g., Chanhudaro, Amri).

In all these areas regional assemblages arise combining some cultural continuity with considerable change (Dikshit). Each peripheral region had a distinctive pattern of change due to different factors and different rates of change. This was clearly a *process* and not a *single* event. Ghosh pointed out that the diffusion going on in this period "cannot be regarded as a homogeneous one." Vishnu-Mittre agrees that the decline was neither uniform nor simultaneous. Some traditions were retained, some modified, and many abandoned owing to their non-utility in new contexts. Many things lost were replaced by new features related to new needs. The question arose as to why the urban aspect of the civilization declined so quickly—a fact which again raised the possibility of elite control rather than basic civic organization. Gupta points out the radical effect of the population shifts on the urban centers with Mohenjodaro dropping from 850,000 m^2 to 30,000 m^2 or so, Lothal from 47,500 m^2 to 20,000 m^2 or so. Soundara Rajan believes that "economic disintegration" was one of the vital reasons for the disappearance of what could be termed the "high life style" of the Mature Harappan Culture. In this process oral tradition and crafts persisted (e.g., in stone, wood, clay, some metalurgy and *faience* making). The basic subsistence techniques present in the hinterland continued. In all probability the Harappan Culture declined without any outside *political* or *military* influence as a devolution related to a variety of causes both social and ecological. Gupta summed up the new processual paradigm by stating that this was "not an haphazard process." There was a conscious effort on the part of people to re-adjust their life to the changed hydrological and socio-economic conditions which the second millennium presented. In the end the "Harappan" gradually merged into the existing local cultures. In many instances this meant true cultural regression as illustrated by the burning of Surkotada at the end of Period IB and its occupation by food gatherer newcomers (as evidenced by thousands of wild seeds) and the introduction of the Black and Red Ware related to the Ahar Culture (Vishnu-Mittre and Savithri).

d) An Invasion of Indo-Aryans as the Major Cause of Collapse

The abandonment of the catastrophe paradigm for the demise of Harappan Civilization has led to the realization that we are dealing with a complex process of cultural change which took place over a prolonged period of time, and which manifested itself in different ways in different areas. Thus, the invasion thesis also becomes a paradigm of limited usefulness. By freeing themselves from this hypothesis drawn from earlier linguistic studies, archaeologists may now focus their attention on the archaeological evidence in its own terms. There is a continuing lack of agreement over the criteria by which the presence of the

Indo-Aryans can be demonstrated and, even more surprisingly, an absence of a rigorous analysis of available archaeological evidence against the cultural content of traditional Vedic literature. Thus, there must be a change of concern from trying to identify the date and direction of movement of an "event" like an invasion to the complexities of the processes of cultural change and adaptation.

Even so, the subject of the history of the Indo-Aryans cannot help but continue to haunt the study of this period of subcontinent archaeology and sooner or later it must be better understood. It is interesting in this regard to note the tendency among Iranian and Central Asian scholars to accept the growing evidence for the continuity of population in the Turanian area from Neolithic times onward—from the painted pottery through the gray pottery of the Bronze Age (e.g. Deshayes 1969) and probably onward through the Iron Age and Parthian Periods (Hlopina 1972: 213-14). The suggestion of an indigenous Indo-Aryan population going far back into pre-history in Northeastern Iran and nearby Turkmenia is now taken quite seriously. With this trend in mind it is interesting that the discussion between present contributors indicated a parallel trend. Both Lal and B.P. Sinha commented on the need to trace the continuity of elements back through the Harappan into the Pre-Harappan and to relate these elements to the Vedic literature. Carl Lamberg-Karlovsky also suggested that Indo-Aryan elements were already present in the Harappan Culture. I. Mahadevan suggested that Indo-Aryan priests married into the local population and that a long period of bilingualism and racial fusion ensued. The hearth at Kalibangan identified as a fire altar was suggested by B. Allchin as indicating the presence of the Indo-Aryans. Thapar (1973: 101) describes this as a ritual hearth with a clay or brick pillar at the center. This feature immediately brings to mind a hearth of this type in room seven of the Burned Building at Tepe Hissar (not indicated in the plan in the site report) and a group of three other such hearths on the Main Mound dated by radiocarbon to the mid-third millennium B.C. (Schmidt 1937; Fig. 162, Fig. 84 square DG 20; Dyson and Remsen, in press). If these were ritual hearths then B.B. Lal's point that Aryans were present at the very beginning of the site is a good one. This is so because there is a close association between such features and Indo-Aryans in India. F.R. Allchin agrees with this correlation; however Lal notes that it is not a feature of later Indian culture.

In relation to the so-called "massacre" at Mohenjodaro, traditionally cited to demonstrate the invasion thesis, Kennedy points out that there is no evidence of injury to the bones of the so-called victims at the time of death. In some cases, however, there are partially healed cranial lesions which indicate wounds several months old. He argues on the basis of the available skeletal evidence that a biological continuum exists with many of the Harappan morphometric variables continuing in the modern population of the Sind and Punjab, thus supporting a concept of population continuity rather than displacement.

The disagreements as to the attributes suitable to the identification of Indo-Aryans spilled over to a discussion of Cemetery H at Harappa. Allchin felt that the birds on the jars represented the sun and fire combined, but Gupta objected that the manner of disposing of the dead in Cemetery H was wrong for the Vedic literature. Deo agreed that basic concepts drawn from the Indo-Aryans were already present in the Indus Civilization. Fairservis expressed his opinion that Indo-Aryans could have been in the Indus Valley a thousand years before we traditionally think so. Jarrige's discoveries at Mehrgarh of direct linkages between the site and Namazga V and VI in Turkmenia in Pre-Harappan times provides an important piece of new evidence for culture contact between these regions which will have to be taken into consideration in any further speculation on this subject.

II. CULTURAL DYNAMICS WERE MORE COMPLEX THAN EXPECTED

The major problem for those seeking a deeper understanding of Harappan Civilization is to construct interpretative models for their data. First in this process must be an effort to provide close chronological control for the data, clear definitions of the terms used, and the application of methods consistent in both their qualitative and quantitative aspects. Interpretation must then begin with some defined guiding concept—in this instance the central concept of a functional archaeological "culture" or a "cultural system" including its ecological setting, could provide an integrating device for the description of all the available material in a meaningful functional context. The comparison of isolated artifacts or patterned groups of artifacts in terms of style or function, or selected ceramic wares does not suffice for this task. Thus, a major problem underlying this set of papers is that there is as yet no agreed upon definition of what constitutes such an integrating mechanism, so that comparative statements are not presently based on comparable criteria from paper to paper. Instead, the discussion proceeds piecemeal, based now on isolated artifacts, now on pottery types, now on radiocarbon dates. What is called for is an approach stressing elements such as overall settlement organization, subsistence activities and architectural traditions (as opposed to simple brick size for example. Masonry represents, after all, a craft tradition in its own right involving far more than brick sizes). An holistic approach to internal patterns of social behavior as indicated by the arrangement of houses and settlements, features and artifacts, burial customs and the like is essential to a full understanding of the process under study. It is the totality of the evidence that speaks to the life style of the Harappan—and it is that style, reflecting their cultural values, that is the subject of the kind of comparisons we must use to understand the nature of the culture and the changes it underwent. We must take the total urban pattern of the Mature Harappan Period as the descriptive base (i.e., including the urban center and its satellite towns and villages). This should be studied as a cultural system in its own terms. The pattern of organization changes, but the population is probably essentially continuous, even if resettled in new locations. As Deshpande pointed out, cultures do not as a rule die abruptly, more usually they are transformed into new forms. As our knowledge grows it is necessary to continually reassess the published and unpublished evidence in terms of changed paradigms and perspectives. This is especially true as previously unassociated materials come to be identified with newly defined cultural units (e.g. floating material in Baluchistan which can now be seen to be Namazga V–VI material). In this process there is also a need to distinguish clearly those aspects of culture and culture change most dependent on environmental determinants from those dependent on cultural and social traditions.

The vast array of new data shows the need for the use of broad concepts of cultural process in understanding the Harappan culture. These concepts must be applicable to a variety of dynamic processes rather than to the simple biological analogy implied by the birth, maturity and death (Early, Middle and Late) sequence.

Much of the work done over the past 10 years has been site specific, but spread over large areas. Since these sites were not isolated, and since it is now clear that a variety of mechanisms were at work at different times—trade networks, colonization, acculturation, cultural regression, etc.—the need for a broader conceptualization of cultural contact is apparent. Ghosh encouraged us to look at parallel processes in search of historic causes. Lamberg-Karlovsky agreed that we could not deny historical models and also pointed out that the whole subject of population growth as a factor in social change was absent from the discussions. Robert Sharer, another non-Indus observer, pointed out the complexity of cultural change in a whole region using the Maya area as an example and emphasizing the importance of studying differential rates in types of change, and the rates of change at different sites, in order to identify the variation in causal factors. He concluded that the term "Indus Civilization" is an artificial concept masking the reality of great variation and that the whole approach to the area to date had been too simplistic to deal with the reality of the phenomena involved.

Much theoretical discussion centered on the role of agriculture as a causal factor in change. Mehta suggested that the early settlement pattern was based on agricultural needs but that in the last stage it was the water supply and sources of raw materials which became major factors in determining locations of sites. He also suggested that agricultural practice leads to conflict which in turn induces control structures which create favorable conditions and support urban populations. Such centers decline when conditions become unfavorable, but are capable of regeneration if conditions change. Lamberg-Karlovsky suggested another model drawn from Sumer and Elam and sites in Iran which include major centers and colonized locations. Yahya and Sialk in the Proto-Elamite levels suggest, he said, direct colonization of a foreign area probably for resource control and to facilitate trade into the primary area. Beyond these sites lay a more distant "secondary area" in which isolated finds indicate only limited contact. This was a pattern which lasted only two to three centuries and then collapsed abruptly with the reemergence of indigenous cultures. He suggested that the concept of primary and secondary areas could apply to the Indus area with Shortugai and Lothal representing colonies and Turkmenistan a secondary area (with isolated "Indus seals."etc.). Jarrige's presentation dealing with Namazga V-VI artifacts and burials at Mehrgarh however, shows that such a model is incomplete and dramatically underlines the true complexity of what is taking place in the Harappan area.

III. TERMINOLOGICAL CONFUSION

A principle cause for the terminological confusion in the scholarship on Harappan Civilization arises from the use of the same term to designate three different concepts: a chronological period, a cultural stage, and an ethnic group.

The basic chronological terminology of Pre-Harappan, Early, Middle and Late Harappan rests primarily on the stratigraphic evidence from Mohenjodaro, Harappa, and neighboring sites in the nuclear area. In this scheme "Pre-Harappan" means those assemblages of varying character which lie stratigraphically below the Harappan; "Late Harappan" is defined by materials in the impoverished terminal levels of Mohenjodaro itself. "Post-Harappan" should logically be what follows but in most papers the term "Late Harappan" is extended to cover this next time period as well. Thus, the term "Late Harappan" as presently used is especially confusing in that it sometimes stands for the time period between the abandonment of Harappa and Mohenjodaro and the appearance of the Painted Gray Ware and sometimes only for the period of the terminal manifestations of the major Mature Harappan sites in the nuclear area.

A confusion is introduced by the shift to a cultural frame of reference in which "Harappan" is equated with "urban." Later assemblages are then called "Post-Urban." The reason for this double usage is the need which has arisen to describe the non-urban settlements in non-nuclear areas which represent a different organizational system following upon the demise of the classic centers. This usage introduces an internal contradiction in that "Late Harappan" at Mohenjodaro is still "urban" while elsewhere it is "post-urban." Such treatment warps any attempt at the interpretation of cultural dynamics since by definition it logically precludes any prosperous settlement with "urban" characteristics from being classified as "Late Harappan," though such centers could well have existed. Fentress pointed out how such terminology affects the plotting of sites since excavators using differing terms make different chronological assessments based on the assumptions underlying the terms. Lal argued for "Late Harappan" as a chronological term applying to a general stage ensuing immediately from the Mature Harappan.

Much of the difficulty in developing separate terms for cultural interpretation arises from the lack of horizontal excavation at sites chronologically of the Late Harappan Period in each geographic region. Such work would establish definitive, full descriptions of the cultural patterns involved. F.R. Allchin also commented on this lack. "Late Harappan" as used by a majority of speakers simply meant the presence of some combination of "Harappan" artifact types (whether 1, 10 or 100) sites in various areas with no weighing of the evidence, and without consideration of the overall functional aspects of each site as an operative community. Possehl stressed the need to add aspects like ecological setting, subsistence pattern, etc., for a reliable system of cultural classification. Instead, at present any sites containing artifacts already known in the classic Harappan are automatically classified "Harappan" when found in a later period. Dikshit used the term "Post-Harappan" for Cemetery H since it is later than the main site, and stated that later but contemporary non-Harappan cultures should not be called "Late Harappan." This suggestion, however, would leave us without a period designation.

The third usage as pointed out by Vishnu-Mittre, links the terminology to ethnic groups by assuming that each pottery ware represents a separate ethnic group. In this situation, by definition, every individual site with two or more pottery traditions automatically becomes a mixed community of separate ethnic groups living together. Y.D. Sharma pointed out that three types of pottery ("Pre-Harappan," "Mature Harappan" and "Baran") may occur at "Mature Harappan" sites but in varying percentages. He suggests that "Late Harappan" is a misused term (thinking of Harappan as a certain type of pottery) since it is applied to several pottery traditions. In the absence of extensive data on the distribution of shapes and functions among such wares, and loci of their discovery in the context of the settlement, the validity of this ethnic approach remains undemonstrated.

Another extremely confusing practice involves the use of "Pre-Harappan" as an identifying cultural term for the later stage of a non-Harappan pottery tradition in the chronological context of the Late Harappan Period! To make matters worse the usage sometimes indicates an ethnic identity as well. Thus artifacts become people, and "Pre-Harappans" live side by side with "Late Harappans" as Mehta pointed out. As an alternative to this approach cultural overlap within single communities has been indicated in some cases by the use of the percentages of wares present as shown by Joshi in his treatment of ceramics. To add further confusion the term "Pre-Late Harappan" has also been introduced (Rao).

Clearly a major task for archaeologists in this part of the world is to agree on some general system of chronological period names, and then to select some specific criteria for naming cultural complexes as an independent exercise. Until this effort is made the organization of the data and the construction of interpretive models will be seriously handicapped.

IV. THE PROSPECTS FOR COORDINATED RESEARCH

A number of papers show a significant trend toward interdisciplinary research through the inclusion of natural scientists. Encouraging progress has been made in mineral analysis, geology, paleobotany and paleozoology. A wider use of flotation techniques for the elaboration of data on the ecological setting and agricultural production of sites promised to add a significant dimension to the data available for analysis. Possehl argued for the use of team research to study all aspects of cultural life and to collect comparable data from place to place. Progress in such research requires an agreed upon problem orientation and methodology. A good beginning has been made along those lines in the trade studies of Fentress and Asthana and the botanical and ecological studies of Vishnu-Mittre and Savithri as well as Agrawal and Sood.

One area where immediate and much needed progress could be made by a cooperative effort is in the construction of an absolute chronology through the systematic collection and evaluation of Carbon-14 (^{14}C) samples for each area. Only through such a chronological structure can a controlled pattern of the rate and direction of cultural change be established (as pointed out by Vishnu-Mittre).

The comparative study of artifact assemblages needs to move from a presence/absence approach to the inclusion of quantitative information which is essential in dealing with slow transitions across geographical zones and vertical change in continuous sequential deposits. At the same time, a greater emphasis is needed not on artifacts as individual types but as groups with functional meaning in relation to one another and to associated features and structures.

A cooperative strategy for sampling several sites for the purpose of comparative settlement study could yield dramatic results. Shaffer points out that two key sites were the sole basis for the reconstruction of a civilization with several hundred known settlements. The most common site, the small settlement, is understood virtually not at all and yet certainly represents the common basis of ancient life. The enlargement of the number of accurately described and studied sites to create an adequate sample for interpretation is thus an important task. Deshpande pointed out in discussion that horizontal excavation aimed at understanding all aspects of the structure and function of the communities in question, rather than a focus on the origin and diffusion of single items, is greatly needed. Thapar made the important point that regional generalizations must rest on an adequate understanding of local material. Local settlement patterns should thus be studied on their own terms as the nuclear Indus Sequence cannot be assumed to be useful over long distances. Within the local studies, concepts of locational geography such as central place theory, site size hierarchies and distances may provide new perceptions of cultural organization (Thapar).

Finally, a cooperative effort for the systematic study of the Indus symbol systems—not just the "script" but also the iconography of seals, figurines and other items—would almost certainly be a rewarding venture.

The foregoing comments perhaps sound overcritical. In fact they reflect a situation brought about by colleagues. The net effect of this work is to vastly enrich the data base available for study. It is an inevitable effect of progress that paradigms which were once useful should be replaced and that the generation of new knowledge should cause conceptual confusion until it has been reviewed systematically and thus synthesized. That is a challenge and the next step. I have no doubt whatsoever of the ability of Indus scholars to deal with this challenge effectively and imaginatively. Clearly the problems of the Harappan Civilization will continue to be one of the most exciting subjects of current archaeology and all of us will be watching for further developments with great interest.

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Index

Abaj, 429
Abbas, Fort, 5, 85, 91, 94, 245, 248
Abqaiq, 344, 350
Aceramic neolithic, 301, 303, 304, 309
Adi Badri, 114
Aegilops squarrosa, 301
Afghan/Baluch area, 199
Afghanistan, 9, 11, 17, 48, 54, 56, 113, 271, 273, 275, 276, 279, 280, 295, 299, 301, 350, 351, 373, 374, 512, 576; Northeastern, 373; South, 116
Africa, eastern, 352; southern, 234, 548
African population, 292
Agate, 111, 150, 154, 178, 181, 239, 448, 463, 491, 559, 562; beads, 138, 263, 399
Agra, 35
Agrawal, D.P., 46, 278, 421, 445
Ahar, 129, 130, 136, 171, 417; Culture, 214, 218, 397, 562, 576; ware, 240
Ahichchhatra, 396
Ahirwala, 128
Ahmednagar District, 175, 214
Ajmer, 36: hill, 273; mines, 276, 280; District, 127, 131, 241
Akhnoor, 185, 263
Akkadian grave, 266; writing, 62
Akkadian period, 327, 347, 354, 370, 376
Al Ain, 325
Al Hasa, 336
Alamgirpur, 23, 135, 136, 138, 163, 397, 398, 399, 406, 407, 408, 409, 413
Alamgirpur I, 121
Alamgirpura, 396
Alcock, Professor Leslie, 101
Alexander, 7
Ali Murad, 11, 12
Alibandar. 35
Allaha Bund, 197
Allahdino, 11, 12, 44, 45, 46, 47, 107, 108, 109, 110, 111, 112, 200, 235, 416, 467, 573, 574; architecture, 109–110; artifacts, 111; excavations, 47; irrigation, 110–111; lithics, 47; trade, 111–112
Allchin, B., 225, 521
Allchin, F.R., 450, 538, 544
Allchin, Raymond, 521
Allen, C.H., 331
Alor, 129
Altai mountains, 276, 277
Alter de Sacrificios, 429, 430, 434, 436, 437, 438
Altiŋ Culture cycle, 51
Altin Depe, 51, 61, 63, 65, 66, 276
Altin people, 52
Altyn depe, 373, 533
Amarnath, 452
Ambaji, 241
Ambakhedi, 53, 56
Ambala District, 248
Ambika River, 9
Ambkheri, 26, 135, 136, 383, 408
America, Central, 428, 429, 430, 431, 434; South, 434
Amiet, Pierre, 62
Amiliano, 107, 108, 109
Amlah, 325, 342, 344
Amra, 170, 413, 417
Amreli District, 417
Amri, 33, 42, 43, 46, 53, 65, 70, 90, 102, 116, 136, 151, 271, 386, 388, 407, 445, 457, 463, 467, 576; culture, 463, 572; pottery, 462, 464–66
Amritsar, 190; District, 158, 245
Amundson, Ronald, 515
Anantpur, 275, 276
Anarak, 277
Anatolia, 313
Anayzch, 328
Andam, 338
Andhra, 277
Andropogon, 214
Animal domestication, 295, 312
Anjira, 463
Antilope cervicapra, 311
Anupgarh, 90, 226, 248
Apaya, 114
Arabia, 367, 382; eastern, 349, 376; southeastern, 323, 331, 335, 336, 338, 341, 342, 344, 347, 348, 349, 352, 353, 354; southern, 352
Arabians, 373
Arabian Sea, 9, 12, 17, 107, 113, 199, 248, 279, 367, 372, 373, 448, 558; Coast, 92, 111
Aravalli Hills, 11, 241
Aravallis, 9, 19, 113, 114, 120
Armenia, 275, 276
Arrow Heads, 126; Banawali, 132; bone, 189; copper, 132; Indus, 281
Artemisia, 34
Arthashastra, 167
Arvavat Sea, 130
Aryans, 37, 52, 102, 389, 391, 392, 452, 577; Vedic, 57, 391
Aryan invasion, 366
Aryavarta, 69
Asia 523; Central, 22, 56, 57, 61, 63, 65, 79, 275, 276, 277, 278, 280, 282, 301, 348, 367, 373, 374, 386; East, 295 South, 42, 82, 215, 273, 292, 295, 352, 387, 495; Southeast, 377; Southwest, 366; West, 72, 79, 267, 273, 278, 406, 424, 562, 563, 564; Western, 218, 234, 301
Asima, 338, 341, 347
Asphalt, 352
Astrabad, 277, 278
Atkot, 198, 201, 413, 417
Atranjikhera, 26, 125, 136, 138, 191, 218, 395, 396, 397, 398, 409
Avanti, 57
Axes, 544–545, 549
Ayodhya, 396
Azerbaijan, 273

Baat, 338, 344
Babarkot, 413
Babylonia, 266
Babylonian lowlands, 371
Bactria, 56, 57, 348
Bactrian pottery, 57
Badakshan, 11, 263, 273, 278, 350, 374, 512
Badrinath, 452

Bagor, 24, 126, 128, 131
Bahadar, 9
Bahadarabad, 53, 56, 136, 191, 397, 418
Bahar, 114
Bahawalnagar District, 90
Bahawalpur, 5, 51, 53, 92, 93, 94; District, 96, 414; Domain, 20
Bahpur, 408
Bahrain, 325, 328, 330, 335, 336, 341, 344, 346–50, 353, 354, 371
Baikal Lake, 273
Bairat, 125
Bajos, 434, 435
Bajra, 199, 215, 219, 457
Bakun, A5 site, 267; ware, 267
Balakot, 65, 102, 273, 276, 305, 312, 467, 575
Baleshwar, 128
Baleshwar-Dariba copper hills, 128
Balu, 12, 24, 53, 161
Balu II, 24
Baluch Hills, 92, 114
Baluchistan, 9, 11, 19, 54, 57, 79, 82, 83, 109, 116, 205, 206, 215, 216, 271, 277, 279, 280, 298, 313, 335, 336, 343, 344, 366, 367, 370, 373, 376, 377, 445, 461, 463, 467, 512, 565, 576; Central, 298; dry plateau of, 3; North, 66; northern, 17, 161, 274, 281; southern, 248, 373
Bampur Valley, 273
Banas, 7, 9
Banaskantha, II; District, 240
Banawali, 12, 33, 52, 53, 91, 113, 114, 115, 117, 118, 119, 120, 121, 126, 161, 205, 206, 215, 273, 275, 406, 407, 409, 413
Banawali-Bara Culture, 115, 121; Post-Indus, 120–122; Ware, 121, 122
Banerjee, S., 223
Bannister, F.A., 242
Bannu, 14, 234, 472, 521, 522, 525, 540, 548
Bannu Basin, 521, 522, 523, 525, 551; sites in, 91
Bannu District, 508
Banswara, 36
Banti Sama, 174
Bara, 23, 25, 33, 54, 122, 130, 135, 136, 143, 191, 397, 406, 407, 413; pottery of, 143, 191; Culture, 157, 158, 161, 162, 163, 407, 409; Ware, 23, 25, 118, 141, 150, 154, 157, 158, 161, 162, 163, 188, 409, 417
Baragaon, 136, 163, 383
Barasingha, 173
Barber Temple, 347–351
Bargaon, 402, 406, 407, 408
Barley, 82, 83, 111, 178, 183, 206, 207, 208, 209, 211, 213, 215, 216, 217, 218, 295, 376, 450, 573; cultivated, 210; hulled, 82, 211, 299; Indian, 211; modern cultivated, 211; naked, 211, 299
Barley grain, carbonized, 212; hulled, 212; naked, 213
Barli River, 131
Barmer, 36
Barrai Khuarra, 551
Bars, 17
Basalt, 9
Batin, 338
Baudhayana Dharma Sutra, 114
Bay of Bengal, 113
Bayazeh, 276
Bazaar Nadi, 107, 108
Bear, 304
Beas, 7, 141, 245, 261
Beck, H.C., 265, 266
Behar, 128
Belize, 427
Belize River Valley, 433
Bengal *see* West Bengal
Beriwala, 226
Berry, A.C., 500
Berry, R.J., 500
Bespura, 131
Beyt Dwarka, 413
Bhadar, 198
Bhadar Valley, 201
Bhadra, 125
Bhagalpur District, 137
Bhagatrav, 413, 417
Bhagwanpura, 37, 55, 56, 93, 114, 122, 158, 162, 163, 185, 189, 190, 191, 193, 396, 397, 399, 407, 417, 418
Bhagwanpura IA, 121, 397, 407
Bhagwanpura IB, 190, 192, 398
Bhagwanpura Culture complex, 398
Bhalbaru, 168
Bhan, Suraj, 26, 52, 114, 128, 158, 387, 417
Bharatpur, 218, 226
Bharuch, 170
Bhatpur, 409
Bhedi, 198
Bhela, 413
Bhilwara, 11, 278, 280; District, 131
Bhit Raange, 457, 461
Bhiwani, 129
Bhoj Raja, 174
Bhudan, 158
Bhudan IB, 161
Bhuj, 35, 198
Bhura, 408
Bhyana, 413
Bibi-no-Timbo, 557
Bihar, 11, 56, 135, 137, 218, 276, 277, 278
Bikaner, 34, 36, 217; District, 131
Bird Jaguar, 431
Bisht, R.S., 154
Bitumen, 9, 352
Blackbuck, 304, 311
Blackman, M.J., 511
Blade industry, 538–41, 552, 559
Black Plague, 434
Black Wares, 93, 125, 136, 171
Bokonyi, S, 296, 297
Bolan Passes, 3, 11, 79, 248, 261
Bolan River, 5, 57, 298, 299
Bopardikar, B.P., 175
Boschtschekul, 277
Bos indicus, 295, 310, 311, 313, 502; *B. taurus,* 311
Bovids, 297, 304, 310
Brachiaria, 214
Brahmagiri I, 175
Brahmavarta, 69
Brassica juncea, 208
Bread Wheat, 82, 301
British Empire, 366
Bronze, 150, 277, 278, 329, 347, 348, 416, 421, 423, 424, 425, 512, 514
Bronze Age, 335, 336, 346, 349, 351, 354, 577; civilization, 365, 371; inscription, 374; sites, 47
Buddhism, 70, 391
Budha Pushkar, 127, 131
Budhi Ganga, 399
Budki Madi, 143
Buff and Cream Ware Culture, 177, 178, 180, 382
Buff Ware, 171
Buffalo, 173, 181, 451
Bukhara, 278, 280
Bukkur gap, 7
Bulandshahr District, 409
Bulsar, 7
Buraimi oasis, 335
Burayda, 328
Burial goods, 493, 494
Burnished Gray Ware, 176, 177, 178, 180
Burnished Thick Gray Ware, 189, 190
Burton, Jim, 512
Burzahom, 3
Burzahom II, 248
Burzhom, 189

Cahr Daud, 277
Calico printing, 34
Cambay, 7, 9, 35
Cambay bead makers, 543
Camel, 376
Caprines, 313
Carbon, 325, 477, 480
Cardi, B. de, 79, 330
Caribbean Coasts, 438
Carmania, 274, 275
Carnelian, 83, 111, 142, 150, 178, 181, 193, 266, 271, 274, 275, 282; beads, 265, 266, 267, 268, 281, 282, 348–350, 371, 399, 491, 493, 559, 562, 566
Cattle, 304, 305, 307, 309–311, 502, 533, 445, 502, 513

Caucasus, 275, 301
Celts, 128
Cemetery A, 136, 266
Cemetery H, 33, 245, 406, 407, 408, 471, 472, 477, 577, 579; Culture, 92, 142, 451; materials, 93; people, 51; Phase, 388, 390; potteries, 54, 121, 122, 191; sites, 53; Ware, 154, 188, 417
Ceramophiles, 233
Ceremic neolithic, 305, 312
Cerros, 430
Chabbuwala Ther, 12
Chah Bahar, 311
Chak Purbane Syal, 245, 261
Chakar nais, 5
Chakrabarti, Dalip K., 237
Chakrabarti, S., 223, 229
Chalcedony, 239, 350
Chalchuapa, 429
Chalcolithic Cultures, 9, 69, 121, 135, 137, 177, 182, 396, 421, 424, 425, 451; settlement, 168, 226, 237; sites, 47, 114, 182, 417, 421, 424
Chambal, 226
Champa, 137
Champaner, 172
Chanda, Ramaprasad, 366
Chandaravati, 171
Chandigarh, 54, 118, 121, 151, 157, 162
Chandrashila, 178
Chanhudaro, 32, 33, 51, 53, 83, 101, 127, 137, 205, 207, 208, 215, 218, 239, 241, 242, 265, 273, 278, 327, 338, 346, 351, 382, 414, 422, 423, 463, 573, 576
Charcoal, 477–479
Charr-Marr-da Theh, 190
Chatalwala, Y.M., 557, 558, 565
Chautang, 5, 91, 226, 227
Cheetah, 173
Chenab, 7, 141, 185, 245, 248, 263
Cheno-amaranths, 214
Cheno-Ams, 291
Chenopodium album, 288–291
Chert, 9, 11, 327, 348, 463, 526, 537, 538, 562
Chichen Itza, 436
Childe, V. Gordon, 41, 267, 381, 313, 423, 451
Chilhera, 399
Chilmak, 273
Chiplata, 128
Chirand, 135, 136, 137, 138, 218
Chirawa, 129
Chital, 173
Chittor District, 130
Chlorite, 274–275, 281, 344
Cholistan 53, 90, 91, 92, 93, 94, 261, 448–450, 467; greater, 90; lesser, 90
Cholistan Desert, 85
Chomu Tehsil, 34
Chong Depe, 63
Chowdhury, K.A., 223
Churu, 36
Cicer arietinum (chickpea), 213
Citadel Mound, 97, 103, 469, 481
Claringbull, G.F., 242
Classic Maya, 429, 432, 434, 438, 439
Classic Maya Civilization, 437, 438, 439; Culture, 439
Cleland, J., 46
Cleuzion, S., 336
Cobalt, 564
Coffin, 493, 494
Coimbatore, 275
Common pea, 183
Constantini, 377
Copan, 429, 431
Copper, 9, 17, 92, 111, 114, 116, 121, 129, 135, 163, 171, 235, 239, 243, 263, 271, 275, 276–277, 280, 329, 344, 347, 348, 351, 354, 416, 424, 448, 449, 512, 514, 533, 566; coins, 189; mines, 128; objects, 126, 128, 130, 192, 193, 200
Cooper-bronze, 46, 178; tool, 282
Copper Hoard Culture, 130, 132, 218
Costantini, L., 82
Cotton, 216
Cozumel Island, 437
Cream Slipped Ware, 177
Cretaceous-Eocene Age, 175
Culbert, T.P., 437
Cuneiform Akkodo-Sumerian inscription, 369
Cylinder seals, 22

Dabar Kot, 54, 374
Dactyloctenium aegyptium 288
Dad Kala Kach Dheri, 551
Dadhar, 298
Dadheri, 37, 54, 55, 93, 122, 158, 163, 185, 189, 192, 397, 398, 407, 413
Dadheri IA, 121
Dahars, 90
Daheda, 169
Dailatpur, I, 121
Daimabad, 9, 175, 177, 178, 179, 180, 181, 182, 183, 205, 214, 280, 382, 383, 413, 415, 416, 417, 421, 422, 424, 425, 426
Dales, George F., 372, 469, 477, 501, 502, 513, 572
Damb Bhuti, 11, 12
Damb Sadaat I, 83
Damb Sadaat II, 33, 84
Damb Sadaat II-III, 64
Damb Sadaat III, 84
Damghan, 275
Damlotti, 107, 110
Dani, A.H., 15, 17
Dariba, 128
Dasht River valley, 349
Date, 301, 376
Daulatabad, 352
Daulatpur, 163, 191, 215, 397, 407
Debari, 277; mines; 417
DeCardi, B., 341
Deccan, 19, 70, 122, 175, 182, 274, 383, 422, 424, 425; lower, 72; northern, 413, 423; southeast, 423
Deccan Trap, 197
Deer, 298, 445
Degenerate Siswal Wares, 26
Deh Morasi Ghaundai, 48
Dehra Dun, 263
Delhi, 263, 575
Delwara Kirovali, 277
Deodar (*Cedrus deodar*), 11
Dera Ghazi Khan, 263
Dera Ismail Khan, 263
Derawar, 12, 53, 91, 93, 94, 245, 248; Fort, 85, 91, 92
Desalpar, 198, 201
Desalpur, 72, 413, 562, 564, 565
Desch, C.M., 281
Deshpande, M.N., 175
Devaliyo, 413
Devni Mori, 274
Dhalewan, 12
Dharan, 344, 348, 349, 350
Dharwar District, 278
Dhatva, 168, 169, 170, 171, 172
Dhavalikar, M.K., 555
Dher Majra, 141, 142
Dholavira, 413, 448–450, 555, 559, 563, 564
Dhule District, 175, 382
Digera muricata, 288
Digitaria, 214
Dikshit, K.N., 85, 396
Dilmun, 336, 351, 354, 371; culture, 335, 347; seal, 372
Dilmun shekal, 348
Diraz, 347
Dish-on-stand, 135, 136, 137, 143, 150, 171, 180, 187, 191, 218, 396, 397, 402, 405
Diyala valley, 370
Dizmar, 273
Djeitun, 301
Doab, 25, 53, 391, 405, 408, 409, 450, 451; Central, 26, 130, 409; Eastern, 248, 250; Ganga-Yamuna, 131, 132, 387, 396, 399, 424; Northern, 26; Ravi-Beas, 141; Rechna, 248; Sabarmati-Mahi, 9; Sind-Sagar, 114; Sutlej and the Yamuna between, 141; Sutlej-Ghaggar, 141
Dog, 173
Dogavari Valley, 382
Dogetha, 274
Dohan River, 128, 130
Dolichos lablab, 216
Drishadvati, 5, 9, 12, 37, 114, 128, 130

Drshaduati valley, 52, 218, 245, 387
Dronamukhas, 167
Dscheskagan, 277
Dur Khan, 298
Durani, Prof., 521
Durganivesa, 167
Durum wheat, 301
Dutch factory, 557
Dvaitvana Lake, 130
Dwarka, 34, 174, 452
Dyson, R.H., 223
Dyson, R.H. Jr., 296, 297

Early Baran Culture, 158, 161–162, 163
Early Classic Period, 429, 437
Early Dynastic Period, 267
Early Dynastic Pottery, 336
Early Dynastic II, 267
Early Dyanstic III, 267
Early Harappan, 23, 472; cultural development, 42, 449, 471; elements, 25, 65; Period, 91, 92, 94; Phase, 37, 448, 450, 482, 492, 495, 533, 551, 552; settlement, 53, 93, 469, 471; sites, 66, 91, 109, 245
Early Harappans, 24, 448, 563
Early Indus, Civilization, 392; culture, 471; settlement, 471
Early Iron Age, cities, 56; sites, 114
Early Iron Age Urban Cultures, 69
Early Iron Phase, 56
Early (Kot Diji/Sothi) Harappan pottery, 25
East Bein, 141, 158
East India Company, 555, 557
Eastern Domain, 20, 25
Eastern Province, 335
Ebla archives, 351
Echinochola, 214
Edens, Christopher, 323, 335
Egypt, 66, 352, 376, 382, 511
Egyptian Civilization, 3
Einocorn Wheat, 82, 299, 301
Ekalasingha, 131
El Salvador, 427; Central, 269
Elam, 61, 62, 63, 64, 65, 66, 67, 266, 346, 578
Elamites, 62
Elana, 131
Elbreez mountains, 276
Elburz, 311
Electrum, 46
Elephant, 423
Eleusine coracana, 214, 215, 216, 217, 288–292, 450
Elm, 11
Emerald, 142
Emirats, 338
Emmer Wheat, 82, 299, 301
Enchinochloa colonum, 291
English factory, 557
Equus cabalius linn., 192
Equus hemionus, 305
Eragrostis, 214
Eshnunna, 370; seal, 370
Etawah, 34
Etched beads, 22, 348–350
Ethiopia, 377
Euphorbia, sp.. 288, 291
Euphorbia pycnostegia, 214
Euphorbia spp., 214
Euphrates, 22, 64, 366
Europe, 295, 297; eastern, 313; southern, 218

Faience, 142, 150, 154, 163, 472, 494, 504–511, 559; bangles, 191, 192; beads, 191, 192, 399, 418
Failaka, 335, 341, 344, 348, 349, 353, 371; seal, 346; sequence, 347
Fairservis, W.A., 79, 83, 102, 116, 223, 236, 381, 457
Falaj al Qaba, 349
Far East, 275
Faranjal, 276
Farghana, 11
Fars plain, 267
Fasa, 276
Fatehbad, 91
Faunal remains, 303
Fentress, Marcia, 44
Fertile Crescent, 295, 313, 365
Ficus, sp., 288
Field, Henry, 85
Figurines, 248, 418, 472, 513, 580; animal, 119, 143, 193, 248, 399, 503–505, 534; anthrophomorphic, 191; anathrophomorphic ceramic, 44; animal 505–505, 534; anthropoid, 502, 506–508; female 502, 507; human, 119, 143; Indus, 119; male, 44, 502, 507; terracotta, 119, 162, 163, 239, 503–507, 528, 533, 539; zoomorphic, 44
Fine Deep Red Ware, 180
Finger millet, 214
Fish hooks, 127
Flakes, 538–540
Fleming, Stuart J., 512
Flint, 11, 111
Foote, Bruce, 538, 544
Frankfort, Henry, 267, 370
French factory, 557
Frifelt, K., 341
Fujairah, 325
Fullol Hoard, 66, 275

Gabarbands, 233
Gadd, C.J., 371
Gamanwala, 91
Gandhara Grave Culture, 57, 248
Gandhara Grave Culture I, 192
Ganeshwar, 9, 19, 24, 125, 126, 127, 128, 129, 130, 132, 409
Ganeshwar-Jodhpura Culture, 130; routes of communications, 128–129
Ganeshwar-Khetri Region, 130
Ganga civilization, 452
Ganganagar, 36, 161; District, 125, 131, 245
Ganga system *see* Gangetic system
Ganga Valley *see* Gangetic Valley
Ganges, 23, 25, 137, 138, 226
Ganges Civilization, 395, 397
Ganges Valley, 69, 70, 72, 113, 114, 122, 391, 392, 397, 406, 408, 409; middle, 396
Ganges-Yamuna Valley, 397
Gangetic Basin, 245; system, 5, 12, 24; Valley, 135, 395, 396
Ganweriwala, 19, 92, 448, 449
Gara Depe, 63
Garden Reg, 9
Gaur, R.C., 136
Gaya District, 137
Gazella, 304; *G. benetti,* 311, *G. subgutturosa,* 311
Gedrosia Domain, 20
Geoksyur I, 63
Geokshurian Culture complexes, 63
Ghaggar, 5, 7, 52, 85, 94, 114, 158, 161, 226, 248
Ghaggar-Hakra Basin, 52
Ghaggar/Hakra (Sarasvati), 24
Ghaggar-Hakra system, 52
Ghaggar (Hakra) Valley, 129
Ghaggar-Hakra-Wahinda system, 12
Ghaggar-Nara flow channel, 12
Ghaggar Valley, 29, 396, 404
Ghaligai, 57
Ghannada, 374
Ghazi Shah, 457, 459, 460, 461, 463
Ghorband Valley, 276
Ghosh, A., 23, 85, 226, 396
Ghosh, S.S., 223
Ghotaru, 129
Gisgarh, 274
Glyptics, 344–347, 353
Goats, 173, 174, 298, 304, 305, 308, 309, 311, 445, 502
Godavari, 7, 175, 421
Godavari Basin, 175, 182
Godavari Valley, 177, 178, 417, 576
Godin Tepe, 62
Gold, 46, 119, 239, 263, 271, 275–276, 280, 282, 383, 493; beads, 351; leaf, 182; ornament, 263
Gomal, area, 245; basin, 525; Passes, 11; Plain 17; River, 5; Valley, 263
Gomti River, 131
Gop, 413

Goudie, A., 225
Gram, 216, 218, 219
Granary, 45, 83, 216, 218, 219
Granite, 9
Grass pea, 292
Gray Slipped Ware, 177
Gray Ware, 185, 187, 188, 189, 190, 192, 193; Harappan variety of, 187; thick coarse, 175
Great Bath, 99, 100, 395, 452
Great Rann, 34, 198
Green gram, 292
Green millet, 214
Grinding stones, 547
Guatemala, 427, 432, 434
Gudea, 275
Gudea inscription, 351
Gujarat, 7, 9, 11, 12, 34, 36, 52, 53, 56, 70, 92, 122, 168, 170, 171, 173, 174, 175, 177, 183, 199, 200, 206, 207, 217, 223, 229, 235, 237, 273, 278, 279, 280, 292, 330, 338, 372, 382, 387, 406, 408, 413, 414, 417, 448, 512, 555, 563, 564; central. 168; coastal southern, 174; north, 168, 170, 274, 281, 413, 417; northern, 34; south, 168, 169, 170, 413
Gulf of Cambay, 7, 9
Gulf of Kutch, 198, 200, 201
Gumla, 11, 12, 46, 54, 65, 271, 386, 388, 508, 533, 551, 575
Gumla I, 90
Gumla II, 64
Gumush Kaneh, 276
Gupta Molded Ware, 399
Gupta, S.K., 200
Gurdaspur, 190; District, 158
Gurnikalan, 12
Guti-Gudea Period, 267
Gypsum, 217, 218

Hab Chauki, 107, 109
Hab River, 5, 11, 107, 109
Hab River Valley, 111
Habuba Kabira, 62, 64, 366
Hafit, 349; burial, 353
Hajjar, burial, 344
Hajnali, 198, 200, 201, 557, 559
Hakra, 5, 12, 37, 85, 90, 91, 93, 94, 245, 248, 575
Hakra Ban, 114
Hakra Ghaggar system, 7
Hakra-Wahinda, 5
Hakra Ware sites, 94
Hakra Wares, 90, 91, 449
Halim, M., 482
Hamadan, 275
Hammers, 544–549
Hanumangarh, 248
Harali, 351
Harappa, 12, 15, 17, 19, 20, 22, 32, 43, 44, 45, 46, 47, 51, 52, 61, 65, 71, 72, 91, 93, 100, 115, 127, 129, 136, 137, 141, 162, 182, 183, 187, 198, 205, 206, 215, 223, 229, 239, 245, 248, 250, 261, 263, 264, 265, 268, 273, 275, 276, 277, 278, 279, 280, 281, 287, 288, 371, 375, 381, 382, 386, 388, 389, 395, 397, 413, 414, 424, 426, 449, 450, 469, 471, 472, 477, 490, 491, 495, 496, 498, 500, 501, 508, 511–513, 515, 516, 533, 548, 552, 562, 563, 573, 574, 576, 577, 579
Harappa/Ghaggar/Mohanjodaro axis, 24; "Harappan", 579
Harappan architectural feature, 45; artifacts, 330; Black-on-Red Ware, 573; burial practices 492–494; burials, 49, 157; Civilization, 70, 71, 79, 197, 200, 218, 223, 225, 229, 239, 267, 268, 365, 381, 382, 383, 416, 438, 445, 469, 496, 497, 500, 563, 564, 575, 576, 577; communication, 199–201; Cultural Complex, 37, 38; Culture, 31, 32, 33, 35, 41, 42, 43, 45, 49, 70, 71, 135, 136, 199, 205, 209, 279, 374, 396, 397, 399, 406, 407, 409, 445, 451, 453, 457, 463, 555, 572, 576, 577, 580; Culture Cycle 51; Empire, 37, 38, 41, 201, 205, 215, 217, 218, 237; food economy, 206–214; inscription, 346; occupation, 292; Phase, 33, 209, 471; plus Early Baran Culture, 158, 162, 163; Red Ware 187, 188, 399; script, 47, 158, 328, 491, 494; seals, 344, 346, 353, 369, 372; settlements, 198, 201, 229, 240, 261, 263, 273, 280, 372, 374, 383, 387, 403, 404, 409, 414, 417, 495, 555, 558, 559, 561, 563, 566, 573; sites, 7, 37, 46, 54, 107, 108, 136, 141, 198, 201, 208, 217, 239, 240, 245, 256–257, 263, 273, 275, 277, 406, 417, 438, 448, 557–559, 563, 565, 575, 576; technological period, 168; trade, 565; trading network, 45; Urbanization, 22, 72, 73, 447, 448; Ware, 33, 189, 399, 407, 417; Wares, 338–344, 354, 374, 559, 566; Weight system, 327, 328, 452
Harappans, 33, 36, 37, 102, 136, 154, 162, 170, 175, 180, 182, 183, 187, 189, 276, 277, 279, 280, 281, 282, 367, 372, 373, 382, 383, 396, 397, 398, 403, 406, 409, 448, 451, 452, 490, 495, 500, 558, 566, 567; cemetery of, 154, 451, 471, 486–489, 492, 500; in Gujarat, 557; in Saurashtra, 555, 559, 562, 564–566; plant economy of, 32
Hardakheri, 408
Hardwar, 399
Hard wheat, 299
Hari Rud, 11
Harike, 7
Harlan, J.R., 295
Harrison, P.D. 435
Haryana, 5, 12, 20, 23, 25, 26, 51, 52, 53, 56, 93, 113, 114, 118, 128, 129, 130, 135, 158, 161, 188, 191, 206, 215, 216, 218, 273, 279, 383, 404, 406, 407, 408, 409, 413, 414, 417, 418, 576; central, 114; eastern, 53; north, 114; southern, 24
Hasan Wali, 107, 109, 111
Hasan Wali II, 109
Hastinapur, 395, 398, 399
Hastinapura, 23, 25
Hazara, 5
Hazara Jat, 276
Hazari Bagh District, 278
Hegde, K.T.M., 225
Helmand River, 93, 275, 282
Hematitie, 491
Hemmy's Indus Weight Unit, 119
Herman, 287
Hili, 8, 325, 336, 342, 344, 350–352, 376; settlements, 374
Hilmand Civilization, 66
Himalayas, 37, 113, 120, 245, 248, 250, 263, 447
Hindon, 396, 397, 399
Hindu Kush, 5, 11, 17, 19, 273, 275, 374
Hingoni Budrukh, 382, 413
Hisham Dheri, 11, 237
Hissar, 63, 91, 129, 373
Hissar District, 113, 114, 245, 383
Hog deer, 173
Hommel, Fritz, 323
Honduras, 427
Horat, Unqa, 344
Hordeum, agriocrithon, 210
Hordeum, agriocrithon Aberg, 210
Hordeum distichon, 215
Hordeum distichon Linn., 210
Hordeum spontancum, 210, 215
Hordeum spontancum Koch, 209
Hordeum vulgare, 206, 210, 215, 295, 299
Hordeum vulgare, L., 209
Horsegram, 183, 215
Hosainpura, 278, 280
Hoshiarpur, 190
Hulas, 135, 136, 163, 191, 397, 398, 399, 402, 406, 407, 408, 409, 413
Hunting, 304
Hyene, 505
Hyktanis River, 275
Hyrcania, 57
Hystera, 34

Ice Age, 224
Ilak, mountains of, 273, 279
Ilopango, 429
Inamgaon, 180, 423, 557

Incised Ware, 171, 191
India, 51, 53, 56, 57, 72, 93, 197, 206, 234, 266, 268, 274, 275, 276, 277, 279, 280, 323, 328, 331, 366, 451, 453, 512, 523, 548; central, 70, 114, 122, 182, 216; culture, 445; north, 218, 219, 385, 386, 392; northern, 336, 540; north-western, 216, 219, 540; south, 182, 275, 383, 544; western, 79, 201, 223
Indian Ocean, 369, 374–376
Indian population, 328, 331, 369
Indian subcontinent, 365, 547, 548
Indigo, 35
Indigofera sp., 288
Indo-Aryan Cultural tradition, 390, 392
Indo-Aryan Culture, 391
Indo-Aryan language, 451
Indo-Aryans, 571, 577
Indo-Iranian borderlands, 330
Indus, 5, 7, 12, 22, 66, 67, 141, 162, 197, 217, 228, 229, 261, 274, 280, 281, 282, 295, 298, 331, 372, 386, 389, 406, 531, 552, 563, 571, 576; Arabian interaction, 335; Basin, 11, 12, 54, 183; lower, 52; northern, 245; Civilization, 4, 6, 7, 8, 9, 10, 11, 12, 65, 70, 79, 85, 92, 113, 233–236, 250, 265, 268, 290, 349, 365, 366, 370, 371, 373, 374, 376, 377, 385, 386, 387, 388, 389, 390, 392, 577, 578; Culture, 70, 115, 120, 168, 237, 381, 388, 471, 525; Delta, 7; Gulf contact, 338; inscription, 341, 344, 508; Plain, 5, 64, 234, 237, 262, 263, 264; Plains, 445, 521, 522; Plant-use strategy in, 287; Red Ware, 118; script, 174, 177, 178, 181, 182, 472; seal, 367, 371; seals, 65; system, 5, 229, 388; Central, 12; Valley, 3, 17, 22, 41, 42, 43, 48, 49, 54, 79, 92, 113, 114, 130, 177, 182, 199, 229, 245, 328, 330, 382, 386, 387, 390, 406, 413, 414, 418, 438, 449, 572, 577; Greater, 91, 92, 93, 261, 271, 312, 335, 336, 341, 346, 463, 471, 472, 521, 536, 540; lower, 463; upper, 92; Wares, 118; weight system, 119
Intaglio stamp seals, 44
Iran, 9, 11, 52, 113, 267, 271, 274, 275, 276, 277, 278, 279, 280, 281, 338, 349–351, 367, 373, 578; Central, 576; dry plateau of, 3; eastern, 22, 84, 295, 372; north eastern 577; northern, 279; plateau, 301, 313, 373, 350, 354; south-eastern, 299; southern, 61, 62, 370, Wares, 341
Iraq, 370, 371; southern, 367
Iranian highlands, 3
Iranian Plateau, 3, 48, 62, 63
Iron, 114, 135
Iron Age, 325, 330, 351, 538, 577; Empire of, 168
Iron Age Urbanization, 73
Isfahan *see* Ispahan
Isin-Larsa Dynasties, 267
Isin-Larsa period, 267, 347, 348, 372, 382, 563
Islam Chawki, 551
Ispahan, 276, 277
Italian millet, 214, 215, 218
Ivory, 338, 350–351, 353, 566

Jacobabad, 261
Jade, 9, 11
Jafarabad, 168, 169, 170
Jagdusha, 199
Jaguar lineage, 431
Jainism, 70, 391
Jaipur District, 34, 125, 131, 241
Jaisalmer, 35, 36, 129
Jalalabad, 267
Jalilpur, 65, 90, 245, 271, 305, 312, 472
Jalilpur I, 90
Jalilpur II, 90
Jalore, 36, District, 131
Jalwali, 91
Jamdet Nasr, 366
Jarriage, J.-F., 376, 377, 572
Jammu, 168, 185, 189, 190, 248, 383, foothill, 250
Jammu and Kashmir, 23, 413, 418
Jamnagar District, 35, 168, 174
Janapadanivesa, 167
Jansen, Dr. Michael, 15, 100
Jasper, 111, 138, 327, 493, 537, 538
Jenkins, Chris, 501
Jatakas, 56
Jawai River, 131
Jawar mines, 276
Jhadol, 131
Jhalawar, 36
Jhang, 17, 263
Jhangar Culture, 33
Jhelum, 7, 245, 248
Jhelum-Yamuna Plain, 250
Jhoka, 367
Jhukar, 53, 55, 101, 102, 261, 271, 373, 382, 451; Culture, 33, 92, 102, 122, 451; people, 51; pottery, 102; settlements, 53; sites, 53
Jhunjhunu, 36, 92; District, 130
Jind, 52; District of, 114, 161, 245
Jodhpur, 34, 35, 36
Jodhpura, 24, 125, 129, 409; Culture, 125; mound, 125
Jokha, 168, 169, 170, 172
Jorwe, 135; 179; Culture, 177, 178, 382; Occupation, 176; Ware, 176, 178, 179, 382
Joshi, J.P., 158
Jowar, 215, 216, 292, 457
Judverjodaro, 12, 261, 264
Jujube, 206, 301
Jullundur, 190, 248; District, 158, 193, 245

Kabul River, 5
Kachi, 5, 57
Kachi District, 298
Kachi plain, 5, 12, 79, 80, 82, 84, 298, 377; north, 312
Kahpuz Depe, 63
Kakadbhit, 198
Kakoria, 396, 397
Kalaheti, 408
Kaleh, 277
Kalepar, 12
Kal-Seb Zarre, 277
Kalibangan, 12, 20, 23, 32, 33, 37, 43, 45, 51, 52, 65, 66, 70, 72, 85, 91, 115, 120, 125, 127, 128, 130, 131, 136, 161, 182, 183, 189, 205, 206, 208, 211, 213, 215, 216, 217, 223, 229, 235, 237, 239, 273, 275, 276, 375, 381, 382, 386, 387, 388, 389, 397, 398, 414, 422, 448, 452, 455, 573, 574, 575, 576, 577; burials, 450; Culture, 115–116; Fabric D, 158; Ware, 118
Kalibangan I, 24, 52, 115, 130, 136, 151, 154, 163, 187, 407; Fabric B, 187; Fabric D, 187; Pre-Harappan, 136
Kalibangan II Ware, 26
Kamalia, 263
Kamalia Plain, 248
Kaminabjuju, 429, 430
Kama Sutaria, 413
Kanahan Nadi, 142
Kandahar, 11, 275, 277
Kandla, 200
Kanewal, 169, 170, 171, 172, 174, 413
Kangra, 263
Kanakaria vago, 169
Kantali River, 128, 130
Kapalmochan, 114
Kara Depe, 63
Karachi, 107, 108, 109, 200
Karadagh, 278, 280
Karakoram, 275
Karatau range, 276
Karnal District, 245
Karnataka, 11, 274, 275, 278, 417
Karbatika, 167
Karun, 366
Kasaunti, 128, 130
Kashan Kohund, 277
Kashmir, 168, 189, 218, 250, 263
Kashmir Valley, 189, 248
Kasi, 57
Kassite parallels, 330
Kathiawad 7, 9, 282, 417; plateaus of, 7
Kathiawar, 275
Katpalon, 54, 158, 163, 185, 193, 407, 413
Katun, 436

Katun Cycle, 436, 438
Kausambi, 138, 395, 396, 397
Kausambi IA, 136
Kautilya, 167
Kawend, 275
Kayatha, 128, 413, 417; culture, 451
Kazakhstan, II, 276, 277
Kennedy, Kenneth, A.R., 496, 572
Kenoyer, J. Mark, 352, 469, 477, 494, 501, 511, 512
Kerano Munjan Valley, 273
Kerasi, 201
Kerman, 352
Kesarising's Khetar mound, 170
Khadir, 198, 199, 200, 201
Khafaje, 281
Khairpur, 129
Khandesh, 174
Khan, Ahmed, Nabi, 469
Khan, Farid, 521
Khan, Mhd-Ishtiaq, 469
Khaparda, 170
Khari, 131
Khatt, 325
Khetri, 9, 129, 277, 281, 351
Khetri Belt, 24, 129, 130, 281
Khetri-Singhana source, 92
Khira District, 169
Khirasara, 198, 201, 564
Khlopin, I.N., 63
Kho-Dariba, 277
Khodjent, 273, 280
Khorasan, 11, 278, 280
Khu-i Nugre, 276
Khuzistan, 62
Kidder, A.V., 435
Kili Ghul Mohammed, 299
Kili Ghul Mohammad II Style, 83
Kili Ghul Mohammad III Style, 83
Kim, 7
Kinderkhera, 413
Kirnam, 273, 274, 276, 277, 280, 281
Kirthars, 3, 11, 374, 445
Kirthar Ranges, 5, 20, 113, 461
Kish, 136, 245, 266, 267, 367, 370
Knight, James, 513
Knobbed Ware, 138
Knossos, 301
Kodekal, 280
Kodo millet, 291
Kohistan, 5, 7, 11, 107, 111, 275, 445
Kokcha River, 273, 280, 374
Kolar mines, 275, 276
Koldihwa, 219
Kopet Dagh mountains, 63
Kopet Dagh rivers, 56
Koppal 417
Kori Creek, 35, 197
Kosal, 57
Kosala, 57
Kot Diji, 23, 32, 33, 42, 43, 46, 65, 66, 70, 91, 116, 129, 136, 158, 161, 171, 386, 388, 407, 461, 467, 472, 533, 555, 575; Pre-Harappan, 136
Kot Diji Culture, 572
Kot-Diji-Jalilpur-Sarai Khola tradition, 501
Kot Diji I, 151
Kot Dijjan Ware, 90
Kot Dijians, 234, 445, 463
Kota-Maholi, 131
Kotada-Bhadli, 413
Kotada Dholavira, 198, 199, 200, 201
Kothara, 198
Kotla Nihang, 24, 141, 162, 573
Kotla Nihang Khan, 23, 141, 190, 383, 407
Kotputli, Tehsil, 125
Kotri, 7
Kounrad, 277
Kramer, S.N., 366
Krishni, 399
Kuba, 171
Kundwala, 12, 93, 94
Kuh Banan, 278
Kuh-i Baba, 275
Kulhade-Ka-Johad, 128
Kulli, 271, 461; culture, 373
Kulli-Harappan symbiosis, 102
Kumaon, 277
Kumar, 275
Kundol, 274
Kung, 548
Kuntasi, 555, 557–566
Kurada, 129, 131
Kurnool District, 417
Kurram Gap, 525
Kurram River, 5, 521, 523, 525
Kurukshetra, 163, 407; District, 158, 191, 215, 248
Kushan, Period, 185, 189; pottery, 189; Ware, 185
Kutch, 7, 9, 35, 36, 168, 174, 197, 198, 199, 200, 201, 229, 273, 282, 331, 413, 417, 418, 512, 555, 558, 559, 564, 566, 567; Central 198; District of, 34; Harappan settlements, 565; sites, 565
Kutch-Kathiawad coasts, 12
Kutchis, 331
Kyzyl Kum, 273, 275, 277, 279, 280
Kyzyl Kum desert, 280

Ladakh, 5, 34
Ladgaon, 175
Lagash, 275, 346
Laghman, 275
Lahore-Multan railway, 469
Lak Phusi, 11
Lakhabaval, 170, 413, 417
Lakhapar, 201
Lakhlargai Dherai, 551
Lakhmirwala, 12
Lakhpat, 35, 217
Lal, B.B., 25, 85
Lamberg-Karlovsky, C.C., 424
Lambrick, H.T., 217, 228, 382
Langhanaj, 171
Lapis lazuli, 9, 11, 22, 48, 82, 83, 119, 142, 174, 193, 263, 266, 271–273, 275, 276, 278, 279, 280, 311, 338, 350, 463, 493, 512, 533, 552, 556
Largy, Tonya, 513
Larkana, 19, 261
Larsa, 347
Larsen, C, 335
Las, plain of, 5
Las Bela, 107, 313
Late Baran Culture, 158, 162–163
Late Baran plus Painted Gray Ware Culture, 158, 163
Late Bronze Age Cities, 56
Late Bronze/Early Iron Age settlements, 500
Late Chalcolithic Culture, 63
Late Classic Maya Society, 431
Late Classic Period, 435, 437
Late Harappan, 23, 163, 336, 338, 563, 579; ceramics, 49; Civilization 414; cultural development 42; Culture, 9, 49, 56, 177, 182, 193, 194, 382, 398, 414, 417, 418, 449, 471; Degenerate, 92; Period, 92–93, 94, 199, 426, 492, 558, 579, 580; Phase, 37, 38, 49, 93, 180, 181, 185, 205, 414, 415, 416, 417, 418, 448; Red ware, 180, 185, 189, 193; settlements, 53, 93, 175, 413; sites, 52, 53, 190, 198, 227, 245, 254–256, 408, 415, 417, 418, 563; Ware, 190, 193, 417
Late Harappans, 51, 52, 189, 190, 191, 192, 217, 383, 415, 417, 418, 580; food economy of, 214–215
Late Pleistocene Period, 175
Late Siswal Ware, 118
Late Stone Age Culture, 172: Microlithic Culture, 70; site, 171
Later Chalcolithic Culture, 135
Lathyrus odoratus, 135
Latin America, 234
Latyayana Srauta Sutra, 114
Leachman, Capt. G., 328
Lead, 46, 271, 275, 276, 281
Lebanon, 500
Lecromina croix, 174
Leiah, 17
Lentil, 183, 215
Lewan, 521, 525, 533, 545, 547, 548; artefacts, 536–537, 539–544; bead-working area, 453; community, 551; culture, 552; sites, 525–528; wares, 529, 531, 532, 533
Limboli, Taluka, 168

Lingas, 235
Linseed, 292
Lithic artifacts, 46
Lithic assemblege, 299
Lithophiles, 233
Little Ice Age, 244
Little Rann, 9, 34, 200, 201
Lohra, 145
Lokha, 274
Long barrel-cylinder beads, 265, 266, 267, 268
Long cylindrical lapis beads, 349
Lothal, 7, 11, 12, 19, 32, 33, 36, 43, 51, 53, 71, 72, 117, 127, 136, 168, 171, 172, 182, 183, 198, 200, 201, 205, 206, 207, 215, 217, 227, 229, 239, 273, 275, 276, 277, 278, 330, 341, 347, 351, 372, 381, 382, 413, 414, 415, 417, 448, 450, 452, 555, 559, 563–565, 573, 576, 578
Lothal B., 55, 122, 415, 416, 417
Lothal Domain, 20
Lothal II, 576
Louvre, 367
Lovell, Nancy C., 496, 497
Lower Town, 100, 103
Lowland Classic Period, 429
Lubaantum, 429
Ludhiana, 190, 248; District, 154, 158, 192, 245
Lukacs, John, 498
Luna, 413
Luni, 7, 131, 200
Lurewala, 93
Lustrous Red Ware, 56
Lustrous Red Ware Culture, 414
Lyari hills, 111

Mackay, E.J.H., 327
Mackay, Ernest, 97, 236, 239, 242, 265, 266
Madhya Pradesh, 168, 275, 281, 417
Madhyadesh, 57, 395
Madow, R.H., 295, 297
Magadha, 57
Magan, 335, 336, 351, 354, 372
Mahabharata, 56, 114, 226
Mahadaha, 500
Mahadevan, I., 99
Mahajanapadas, 56, 57, 69
Maharashtra, 168, 175, 180, 199, 219, 278
Maheswere, 172
Mahi, 7, 9
Maize, 215
Majumdar, N.G., 457, 461, 463
Makain, 277
Makran, 9, 12, 352, 372, 373
Makran Baluchistan, 11
Makran coast, 199, 200, 273, 382
Malaria, 434
Maler Kotla, 158
Malhar Rann, 225
Malhera, 409
Malir Basin, 111
Malir River, 5, 107, 110
Malir system, 110
Mallinath, 199
Malvan, 169, 170, 174
Malwa, 179; Culture, 177, 382, 397; Ware, 176, 177, 178, 425
Manava Dharma Sastra, 114
Manchar Lake, 5, 7, 12, 548
Manda, 11, 23, 24, 34, 141, 185, 189, 190, 248, 263, 407, 413, 417
Maner, 137
Mangalasutra, 239
Manjhi, 137
Manot, 12
Manpur, 409
Margiana, 57
Mari, 274
Markanda, 7
Marot, 226
Marshall, Sir John, 97, 129, 235, 236, 237, 281, 365, 366, 367, 387, 425, 548
Marwar, 171
Mashkai-Jhalwan area, 223
Maski, 280, 417
Masson Charles, 31, 469
Mathooka, 128
Matsya Desa, 125
Matsyanyaya, 174
"Mature Harappan", 336, 448, 562, 579
Mature Harappan ceramics, 44; cultural development, 42; cultural complex, 42, 43; culture, 235, 414, 449, 450, 471, 576; gridiron layout, 45; material 24; material culture, 43, 44, 45, 46; period 92, 93, 94, 189, 237, 347, 482, 492, 495, 508, 572, 573, 575, 578; phase, 38, 49, 338, 415, 416, 417, 558; settlements, 45, 201, 235, 407, 413, 477, 480; sites, 7, 15, 43, 44, 46, 48, 53, 54, 84, 93, 198, 235, 236, 245, 408, 417, 573, 579; urban sites, 43; ware, 491
Mature Harappans, 24, 414, 451
Mature Indus, civilization, 65, 290, 392, 472; culture, 116–120, 235, 237, 522, 539; settlements, 471; site, 245; urban period, 537, 548; urban sites, 543
Mature Urban Culture, 387
Mauryan Empire, 167
Maya, 428, 431, 432, 433, 435, 436, 438, 439, 578; low land, 428, 429, 430, 432, 433, 434, 436, 437, 438; southern, 429
Maya Civilization, 427, 428, 429, 432, 433, 434
Maya Classic, 428
Maysar, 325, 328, 330, 338, 339, 344, 346, 347
Mazanderan, 273
Mazyad, 347
McCarthy, Blythe, 511
Meadow, Richard, 82, 295, 502
Medieval Historic site, 49
Mediterranean, 511; Region, 72
Meerut, 398; District, 136, 406, 409
Meggers, B.J., 435
Mehgam, 168, 413, 417
Mehi, 271, 277, 348
Mehrgarh, 57, 79, 81, 82, 83, 84, 273, 274, 280, 298–303, 376, 445, 463, 467, 500, 532, 537, 552, 572, 577, 579; cultural development of, 298; faunal data of, 295
Mehrgarh Mound Three, 82, 83
Mehrgarh VI, 274
Mehta, R.N., 236, 237
Melechha, 17, 65, 273, 275, 278, 280, 281, 282, 382, 424
Melilotus sp., 288
Meluhha, 354, 369, 371, 372, 564; copper, 351
Meluhhans, 370
Mery, S., 374
Meshad, 275, 277
Meso-America, 429, 433, 436, 437
Mesolithic Culture, 233
Mesolithic site, 538
Mesopotamia, 3, 22, 23, 41, 43, 48, 61, 62, 65, 66, 67, 79, 263, 266, 267, 268, 271, 273, 278, 280, 281, 313, 335, 336, 338, 346, 347, 349, 352, 367, 371, 372, 373, 386, 450, 573; Greater, 301; northern, 349; southern, 62, 354; seal, 367, 369–371
Mesopotamians, 367, 382
Mesopotamian seal, 65
Mexican Gulf Coast, 429, 430
Mexico, 427, 429, 430; Central, 428
Micaceous Red Ware, 201, 279, 417
Microlithic material, 526
Middle Classic hiatus, 436, 437
Middle East, 295, 296, 297, 299, 310, 312, 313, 367; animal domestication, 295
Middle Elamite period, 330
Middle Harappan Phase, 37
Middle Pre-Classic Period, 429
Mihran of Sind, 5
Miliolote limestone, 561
Miller, Heather, 515
Millet, 291, 295, 376, 573
Mirador, 430
Mirzali Khan Dheri, 551
Mirzapur, 118, 163, 407, 413
Mitathal, 12, 25, 33, 52, 115, 116, 122, 129, 135, 407, 409, 413
Mitathal I, 24
Mitathal IIA, 407
Mitathal IIB, 26, 52, 54, 121, 162, 397, 407

Mithankot, 5
Mithrau, 129
Moh Scale, 239, 241, 242
Mohammad of Gazni, 35
Mohenjodaro, 12, 15, 17, 19, 22, 32, 33, 43, 44, 45, 46, 47, 51, 53, 54, 71, 72, 92, 97, 100, 102, 104, 111, 115, 127, 129, 136, 137, 141, 162, 171, 182, 198, 205, 207, 208, 215, 218, 223, 228, 229, 235, 236, 245, 248, 250, 261, 263, 265, 266, 268, 273, 274, 275, 276, 277, 278, 280, 281, 327, 328, 338, 344, 349, 351, 365, 366, 371, 381, 382, 387, 388, 389, 390, 392, 395, 397, 413, 414, 417, 422, 425, 448–451, 471, 472, 482, 501, 511, 533, 548, 552, 561, 572, 573, 574, 575, 575, 576, 577, 579; axes from, 328–329; DK Area of, 44, 100, 103; DK-B Area of, 99; DK-I Area of, 99; HR Area of, 99, 100, 102, 103; VS Area of, 99, 103
Mohenjodaro Domain, 20
Mohenjodaro excavation, 46
Moneer, Q.M., 97
Moneer site, 15, 97, 99, 100
Montogomery District, 206, 261
Mora, 35, 217, 274
Mohra, 274
Motagua fault, 434
Motagua, River, 438; Valley, 431
Mount Abu, 37
Mughai, M. Rafique, 15, 20, 65, 102, 119, 448, 451, 469, 472, 469, 572
Mula, 3
Mula Pass, 11, 261
Multan, 7, 263
Mundan, 35
Mundan, 217
Mundigak, 48, 54, 63, 84, 206, 215, 280, 282
Mundigak II, 205
Mundigak III, 274
Mundore Fort, 35
Mundra, 198, 200
Mung, 215
Munigak, 346
Murgab Valley, 52
Muruntau mountains, 275, 280
Musa Khel, 17
Musai, 277
Muscat, 328, 331, 376
Mushkat, 3
Muzaffarnagar, 53; District, 406
Mysore, 279, 280, 281, 282

Nadi, 114
Nagar, 54, 158, 163, 185, 193, 407; District, 225
Nagara, 172
Nagaur, 129; District, 131
Nageshwar, 555, 564
Nagwada, 564
Nahli, 409
Nai, 114, 130
Naing Nai, 457, 461
Naitandava, 37
Naiwal, 5
Najafgarh Lake, 130
Nakhatrana Taluka, 198
Nakhlak, 276
Nal, 271, 463
Namazga Depem, 51, 63
Namazga III, 63
Namazga III/Geoksyurian Cultural Complex, 64
Namazga V, 63, 276, 577
Namazga V-VI, 579
Namazga VI, 56, 577
Namazga VI pottery, 57
Namazga VI times, 52
Nandlalpura, 131
Nar, 168
Nara, 228; eastern, 226
Nari, 5
Nari River, 298
Narmada, 7, 9, 10
Narmini, 37
Narnaul, 129
Narwana, 52
Nausharo, 298
Navadatoli, 57, 128, 135, 136, 396
Navinal, 198, 201
Nayabans, 399
Near East, 365
Neem-ka-Thana, 129; Sub Treasury at, 125; Tehsil, 128
Neolithic, 303, 312; culture, 445, 450; deposits, 299; period, 373
Neolithic Brzahomians, 218
Neolithic Chirand, 138; culture, 135, 218; deposits, 82, 83; food economy, 218; people 189, 219, 274, 383; Period I, 90
Nesh, 277
Netra Khirsara, 413
Nickel, 9, 281
Nilgai, 173, 174
Nindowari, 102
Nippur, 245, 371
Nisanta Pranadhih, 167
Nishapur, 274, 275, 279, 280
Noh, 125, 409
Norhtern Black Polished Ware, 395, 396, 399; period, 396
Northern Polished ware, 451
Northern Tropical Thorn Forest, 34
North West Frontier Province (NWFP), 234, 521, 522
Northwest Frontier, 17, 19
Nowshahro, 374
Nowsharo, 11, 12, 84
Nudziba, 325
Ochre Colored Pottery (OCP), 25, 26, 33, 125, 129–130, 281, 408, 409; complex, 56; food economy of, 218; sites, 53, 136, 218; Ware culture, 218, 219
Ochre Colored Ware, 191, 383, 405, 406
Okhamandel, 35
Old Police Station, 481
Olinec, 429
Oman, 9, 277, 281, 323, 328, 329, 330, 338, 351, 352, 372, 373–376; peninsula, 325, 331, 336, 370
Onaur, 396
Onager, 304
Oppenheim, L., 371, 372
Orangi, 109
Orissa, 276
Oxus Basin, 11
Oxus River, 48, 65, 280, 382
Oxus system, 56

Pabumath, 198, 200, 201, 413, 558, 562, 564, 565
Padhegaon, 175
Painted Black on Red Ware, 562
Painted Gray Ware (PGW), 25, 33, 93, 122, 125, 130, 163, 188, 189, 190, 192, 193, 248, 396, 399, 407, 417, 579; complex, 56; culture, 38, 157, 158, 163, 194, 395, 397, 398, 407; people, 191, 383, 402, 403, 406; phase, 185; settlements, 94, 344; sites, 130, 190, 249, 250–254
Painted Gray Ware/NBP occupation, 26
Pakistan, 79, 85, 92, 93, 94, 101, 128, 162, 192, 197, 206, 223, 226, 237, 245, 271, 274, 295, 304, 310, 328, 371, 373, 374, 386, 414, 445, 448, 457, 490, 495, 513, 521; Western 301
Palampur, 278
Palestine, 500
Palette stones, 546, 547
Pasepattan, 263
Pamirs, 273
Panchasar, 563
Panchavisma Brahman, 114
Panchinad, 5, 17, 19
Pande, B.M., 451
Pandi Wahi, 11, 12, 54
Pandu Rajar Dhibi, 137
Pandya, P.P., 557
Panicum, 214, 450
Panicum miliaceum, 215
Panicum sp., 288; *P. miliare*, 288–291
Panicum sumatrense, 215
Panipat, 52
Panjsher Valley, 276
Par River, 9
Parbatsar-Kurada, 129
Parpola A., 99, 508

Parthia, 57
Parthian Period, 577
Paspalum scrobiculatum, 215, 291
Pathani Damb, 374
Pathiani Kot, 261
Patiala, 190, 226; District, 245, 248
Patialvi, 7
Pea (*Pisum arvense* L.), 206, 215
Pehoa, 114
Peloponnesian Wars, 436
Pendali, Elise, 515
Pennisetum typhoides, 216
Periano, A. 90
Periano Ghundai, 90
Persepolis, 267
Persian Gulf, 17, 113, 200, 201, 271, 335, 386; seal, 344, 377; trade, 354; weights, 353; central, 344, 346
Peten Central, 432
Pezu gap, 551
Phalodi, 36, 129
Phoenix dactylifera, 301
Phragmites Karka, 214
Phulki River, 558
Pidaria, 170
Piedras Negras, 435
Piggott, Stuart, 135, 223, 424
Pigott, Vincent C., 511, 512
Pigs, 173, 174, 297, 451
Pikhami, 408
Piklihal, 280
Pind Padliya, 130
Pindi Wahi, 271
Pine (*Pinus roxburghii),* 11
Pirak, 298, 346, 352, 377
Pir Panjal Range, 185
Pir Shah Jurio, 107, 109
Pisum, 218
Pisum arvense, 208, 213
Plain Gray Ware, 192
Pokaran, 129
Pokurna, 35
Polygonum spp., 214
Porabander, 9
Porali Basin, 111
Porali River, 5
Possehl, Gregory, 228, 408, 448, 450, 472, 565
Post-Akkadian Period, 267
"Post-Harappan", 579
Post-Harappan, Chalcolithic Culture, 136; Chalcolithic sites, 57; Culture, 33, 34, 70, 135, 183, 240, 406, 449, 471; Period, 93, 386, 576; technological period, 168
Post-Indus culture, 115
"Post-Urban", 579
Post-Urban Phase, 25
Potts, Daniel T., 323, 338
Potwar Plateau, 245
Prabhas, 198, 413
Prabhas Ware, 33, 56
Prakash, 215
Pravara, 175, 177, 382, 421
Pre-Classic Period, 428, 429
Pre-Columbian Mesoamerica, 365
Pre-Defense Harappa, 151, 154, 161, 187, 407; Ware, 121
"Pre-Harappan", 579
Pre-Harappan Bara pottery, 54
Pre-Harappan, 563; Culture, 33, 71, 79, 130, 158, 161, 163, 397, 406, 471; food economy, 206; genre, sites of, 12; phase, 38, 209; pottery, 158, 187, 189; Red Ware, 187; settlements, 32, 387; sites, 7, 12, 51, 129, 245, 257–258; technological period, 168; Ware, 190
Pre-Harappans, 33, 189, 205, 398, 580
Pre-historic sites, 17
Pre-Indus Culture, 115–116
"Pre-Late Harappan", 580
Pre-Sargonic Period, 267
Pre-urban Harappan, 472
Pre-Urban Harappan phenomenon, 24
Proto-Elamite material inventory, 62
Proto-Elamites, 64
Proto-historic Culture, Chalcolithic stage of, 70
Pugal, 131
Pulki river, 558
Punjab, 5, 7, 11, 12, 15, 17, 23, 25, 52, 54, 56, 57, 70, 92, 93, 113, 118, 128, 129, 130, 135, 158, 162, 168, 185, 188, 189, 190, 192, 208, 215, 216, 218, 223, 236, 241, 263, 279, 282, 312, 366, 383, 389, 390, 391, 392, 396, 406, 407, 408, 409, 413, 414, 418, 500, 522, 563, 565, 566, 576, 577; East, 20, 92, 387; lowlands, 17; rural, 118; southern, 216; south-western , 261; West, 17, 20, 280
Punt, 376
Puran, 35
Pranas, 56
Puras, 37
Puri, 452
Puri, K.N., 97
Purna River, 9
Pusalapadu, 274
Pushkar, 225
Putun Maya, 437

Qadirabad, 515
Qala'at al-Bahrain, 327, 336, 341, 372, 350, 351, 353
Qasimi, 328
Qatar, 335
Qishm, 352
Quetta, 161, 299
Quetta Valley, 84
Quirigua, 429, 431, 434, 436, 438
Qurum, 348
Quttarah, 351

Ragi, 215, 216, 218
Rahimar Khan District, 90
Rahman Dheri, 11, 12, 54, 66, 84, 90, 91, 237, 271, 273, 275, 280, 467, 472, 529, 532, 533, 551
Raichur District, 417
Raikes, Robert L., 104, 223, 226, 382
Raja Karam-ka-Qila, 141, 397
Raja Sirkap, 158, 161
Rajasthan, 5, 11, 19, 24, 26, 35, 36, 52, 70, 92, 122, 128, 130, 132, 168, 171, 200, 208, 216, 223, 224, 225, 226, 241, 273, 274, 275, 276, 277, 278, 280, 281, 351, 382, 413, 418, 448, 450, 451, 512, 522, 565; eastern, 219, 407; northern, 23, 24, 25, 93, 114, 120, 218, 227, 244, 248, 250, 279; southern, 214; West, 34 Western, 227
Rajasthan desert, 35, 37, 215, 216, 218, 387
Rajgarh, 129
Rajghat, 396
Rajkot district, 53, 56, 557
Rajpipla, 275, 282
Rakhigarhi, 35, 115, 161, 264, 383, 448-450
Ramavaram, 417
Ramayana, 56
Rameshwaran, 452
Rang Mahal People, 53
Rangoi, 114
Rangpur, 32, 33, 36, 72, 135, 136, 168, 183, 198, 201, 207, 215, 217, 241, 330, 413, 414, 415, 416, 417, 450, 451, 573
Rangpur IIA, 199
Rangpur IIB, 415, 516, 573, 576
Rangpur IIB-C, 55, 199
Rangpur IIC, 122, 199, 415, 416, 573
Rangpur III, 122, 573
Rangpur Period IIA *see* Rangpur IIA
Rangpur Period IIC *see* Rangpur IIC
Rann, 564, 565
Rann of Kutch, 7, 113, 131, 197, 198, 199, 200, 226, 331
Rao, S.R., 177, 372, 424
Ras al Hadd, 338
Ras al Junayz, 338, 347, 374–376
Ras al-Khaimah, 325, 338
Ras al-Qalat, 325
Ratanpur, 282
Rathji, W.L., 435, 437
Ratnagar, Dr. S., 19
Raval, M.H., 288
Raval, M.R. 558
Ravi, 7, 17, 52, 141, 158, 245, 248, 261, 263
Ravi River, 515, 516

Reade, J., 371
Reddy, Seetha, 515
Red Ochrewashed Ware, 396
Red Ware, 93, 125, 136, 171, 189, 191, 192, 193, 382, 417; dull 177; handmade, 121; non-Harappan, 399; site, 130
Redfied, Robert, 386
Reed, C.A., 79
Reserved Slip Ware, 171
Rewari, 129
Rhinoceros, 173, 174, 423, 502, 505
Ribbed Bichrome Ware, 180
Rice, 207, 208, 215, 216, 217, 218, 219, 295, 377, 451, 573
Ridder, 277
Rigveda, 37, 114, 390, 392
Ringstones, 543, 544, 547, 548
Riyadh, 328
Robat, 281
Rohri, 7, 11, 328, 388; hills, 552
Rohtak, 91
Rojadi, 9
Rojdi, 198, 201, 239, 413, 416, 417, 450, 451, 555, 562, 566; occupation, 287-288; plant-use, 287–292
Roman trade, 371
Roopnagar, 115, 121
Roopnagar I, 118
Ropar, 7, 11, 23, 54, 118, 141, 142, 143, 151, 158, 161, 162, 190, 226, 245, 263, 383, 399, 406, 407, 408, 413, 417, 450, 573
Ropar I, 151, 407
Ropar IA, 24, 151, 161
Ropar IB, 24, 151, 162
Royal Grave, 266
Rubbing stones, 547
Rudra-Siva, 392
Rufayah, 341, 350
Rumeilah, 325
Rupen, 9
Ru'us al-Jibal, 325

Sabania, 131
Sabarkanta District, 241
Sabarmati, 7, 9
Sabi River, 125, 130
Sabi Valley, 52
Sabloff, J.A., 437
Sabzwar, 277
Saddle Querns, 547
Sahara, 35
Saharanpur, 138; District, 53, 136, 399, 406
Sahera, 217
Said Qala Tepe, 48, 64
Sai-no-tekro, 170, 172
Saipai, 26, 409
Sali, S.A, 382
Salt Range, 245
Samad, 351
Samarangana Sutradhara, 174
Samarkand, 278, 280
Sambhar Lake, 37, 52
Sanduman, Fort, 274, 281
Sandhanawala, 12
Sandstone, 9
Sanghol, 24, 54, 122, 151, 154, 161, 163, 409
Sanghol IA, 118, 121
Sanghol IB, 54, 120, 121
Sangrahamis, 167
Sangramikam, 167
Sangrar, 129, 190
Sangrur, 245
Sankalia, Prof. H.D., 57, 236
Sappali-Dashly, pottery, 57; sites, 56
Sarai Khola, 12, 17, 46, 65, 90, 271, 386, 407, 472, 500
Sarai Khola II, 151, 154
Saran District, 135
Sarangpur, 158, 161
Sarasvati, 5, 7, 9, 23, 24, 25, 37, 93, 94, 113, 114, 158, 163, 191, 226, 263, 451; Basin, upper, 72; Valley, 12, 52, 114, 218, 261, 263, 383, 387
Sarasvati-Drishadvati, 248; Valley, 383, 563
Sargon the Great, 369
Sar el-Jisr, 348, 350
Sari-i-Sang, 273
Satapatha Brahmana, 130
Satterthwaite, L., 435
Saudi Arabia, 274, 277, 335, 336, 344, 353; western, 274
Sauer, Carl O., 376
Saurashtra, 9, 35, 122, 170, 171, 174, 197, 198, 200, 201, 279, 382, 387, 406, 408, 413, 417, 418, 451, 512, 558, 563, 564, 567, 573, 576; Central, 168, 287, 417
Savalda, 9; Culture, 177; Ware, 177, 382
Sawa millet, 291, 292
Sawai Madhopur, District, 131
Scrapers, 539
Sea shells, 83
Sedges, 214
Segak Mound, 277
Sehore, 241
Seibal, 429, 430, 437, 438
Seistan, 11, 64, 93, 275, 282
Serahs, 63
Sesame (*Sesamum indicum*), 206, 216
Setaria sp., 214, 215, 217, 288–291, 450
Setaria italica, 214, 216, 289, 291
Setaria glauca, 216
Shaffer, Jim, 111, 279, 573
Shaga-Darra-i-Robat-i-Paskaran, 273
Shah Bellual, 281
Shah Jahan, Emperor, 555
Shah Maqsud, 277
Shah Rud, 278
Shahdad, 83, 274, 275
Shahi Sokhta, 351
Shahi Tump, 271, 277
Shahiwala, 93
Shahr-i-Sokhta, 48, 51, 52, 63, 64, 83, 84, 273, 274, 275, 279, 280, 282, 346, 463
Shahr-i-Sokhta II, 274
Shakra, 328
Shamlaji, 172
Sharer, Robert, 578
Sharjah, 323, 325
Sharma, G.B., 163
Sharma, G.R., 395, 396
Sharma, Y.D., 54, 120, 407, 573
Sharjah, 323, 325
Sharqiyah, 325
Shastri, K.N., 469, 492
Shatrana, 226
Sheep, 173, 298, 304, 305, 308–311, 445, 502, 505
Shell, 352
Sheri Khan Tarakai, 508, 551
Shikarpur, 564, 565
Shimal, 327, 328, 330, 338, 341; burial, 347, 348, 350
Shortugai, 11, 48, 65, 66, 273, 276, 278, 328, 373, 374, 578; sites, 17
Shri Ganganagar, 34
Shrirampur Taluka, 175
Siah Damb, 277
Sialk *see* Tepe Silk
Siberia, 275; eastern, 273
Sibri, 298
Siddhuwala Ther, 92
Sikar-Jhunjhunu, area, 129; District, 130
Silver, 46, 239, 271, 276, 351
Simashki, 62
Simla, 263
Sind Kohistan, 3, 457, 458
Sindh, 5, 7, 9, 11, 12, 35, 49, 52, 92, 109, 122, 136, 174, 197, 198, 199, 200, 201, 206, 207, 208, 215, 216, 237, 261, 279, 280, 282, 338, 366, 373, 376, 377, 382, 383, 386, 406, 457, 463, 522, 548, 555, 563, 565, 571, 577; Upper, 552
Sindhi Bhattias, 328, 331
Sindri, 35
Singanapalli, 274
Singhana, 277
Sinha, K.K., 396
Sirhind, Nadi, 7
Sirhind, 226
Sirsa, 142; District of, 114
Siswal, 12, 24, 25, 52, 116, 130, 135, 154, 407, 413; Complex, 23, 26; Ware, 26

Siswal A, 24
Siswal B, 24, 158
Siswal IIB, 191
Siswal LLB, 397
Śiva-Mahadeva, 392, 418
Śiva-Pasupati, 392
Sivirights, Robert, 199
Siwaliks, 5, 7, 114, 263
Siwalik deposits, 523
Siwalik ridge, 525
Skandhavaras, 167
Sling Stones, 544, 548
Smallpox, 434
Smriti code, 72
Soghun Valley, 274
Sohar, 323
Sokta Koh, 372
Somnath, 33, 168, 416
Sonari-Jodhpur, 130
Sonepur, 137
Sorath culture, 450
Sorath-Harappan site, 287
Sorghum, 216, 219, 295, 352, 376, 377, 450; *S. bicolor,* 292
Sota River, 128, 130
Sothi, 23, 42, 43, 52, 130, 161, 447; Culture, 572
Sothi-Bhadra, 129
Sotkakoh, 201, 278
Sottar, 5
Sottar Valley, 114
Soundararajan, K.V., 565
South Asian population, 301, 500; non-, 292
South Asian subsistence systems, 287
Soviet Central Asia, 51, 52, 53, 56, 63, 271, 274, 275, 277, 278, 279, 280
Soviet Union *see* USSR
Spear heads, 127
Spiral-headed Pins, 128
Squat ribbed bead, 349
Sravasti, 396
Sri Lanka, 290
Sringaverpura, 396
Steatite, 11, 142, 159, 174, 239, 241, 242, 263, 271, 274, 275, 279, 344, 367, 383; beads, 138, 418, 491, 494, 559; seals, 118, 371, 509; source, 281; telcose, 241, 243; taken, 510
Stein, Aurel, 15, 85, 92, 223
Stone tools, 551, 552
Strahan, Donna, 493
Stupa Mound, 103; SD Area of, 100
Sthaniya, 167
Suasti, 239
Subbarao, 538
Sukhar Rohri, 129
Sukkur, 7, 11
Sukkur Barrage, 52
Sulaiman ranges, 3, 5, 19, 113, 245, 248
Sulaiman-Kirthar ranges, 111
Sulemanki, Weir, 5
Sumer, 61, 63, 64, 65, 66, 67, 268, 578
Sumerian antiquities, Civilization, 268; economic documents, 17; groups, 23; society, 369
Suktagendor, 372, 565
Suleiman plateau, 374
Sumerians, 62, 64, 271, 274, 278
Sunga-Kushan Ware, 399
Sur, Sher Shah, 114
Surat, 557
Suratgarh, 226
Surkotada, 32, 33, 37, 44, 71, 72, 172, 198, 199, 201, 205, 214, 215, 217, 218, 388, 406, 413, 450, 555, 558, 562 564, 565, 566, 573, 575, 576;
Susa, 61, 62, 63, 245, 267, 327, 328, 347–349, 351, 367, 415; susiana plain, 336
Susiana, 62, 79
Sutkagendor, 11, 12, 72, 201, 273, 278, 575
Sutlej, 5, 7, 23, 24, 25, 85, 94, 141, 142, 154, 158, 161, 163, 226, 229, 245, 248, 261, 263
Sutlej Basin, 54, 383
Sutlej Valley, 129, 404, 406, 408, 409, 417
Sutlej-Harappan Complex, 158
Sutluj *see* Sutlej
Swat Valley, 248
Syr Darya, 274, 280
Syria, 281, 347, 349, 351

Tadjikistan, 57
Taittiriya Brahmana, 37
Takalik, 429
Takht-i-Suleiman, 275
Tal-i-Ghazir, 62
Tal-i-Iblis, 277
Tal-i-Malyan, 62
Taldjen River, 275
Tamarindus indicus, 35
Tapi, River, 169, 170, 174; Basin, 175, 183
Tapti, 7, 9; Valley, 175, 176, 182, 382, 383; lower, 9
Tapti-Godavari Valley, 413
Tarakai Qila, settlements, 551
Tarut, 336, 344, 349
Tatarpur kalan, 408
Tawi Silaim, 349, 351; burial, 353
Taxila, 57, 245, 386
Taxila Valley, 91
Tedzen Delta, 63, 64
Tel Asmar seals, 65
Tell Abraq, 331, 338, 347, 348; blade axes, 328–329; tradition, 322-330
Tell Agrale, 267, 268
Tell Ahaimir, 367
Tell Asmar, 370
Tell Ramadh, 336, 344, 350, 353
Telloh, 367
Telod, 168
Temba Bulach, 277
Teotihuacan, 429, 430, 431, 437
Tepe Faukhabad, 330
Tepe Hissar, 577
Tepe Sialk, 62, 63, 578
Tepe Yahya, 22, 48, 62, 64, 65, 66, 267, 268, 274, 275, 346, 349, 352, 578
Tezin, 277
Thal Desert, 245
Thanesar-Kurukshetra, 114
Thano Bulla Khan Road, 107
Thapar, B.K., 85, 223, 396
Thapar, Romila, 562
Thar Desert, 3, 5, 20, 24, 94, 113
Thar Parker, 174
Thatta, 7
Thick Burnished Gray Ware, 188, 248
Thick Coarse Red Ware, 177
Thick Coarse Ware, 180, 181
Thick Gray Ware, 399, 402
Thompson, Sir Eric, 435, 437
Tidi, 131
Tigris, 22, 64, 366
Tikal, 429, 430, 431, 432, 434, 435, 436, 437, 438
Tikrial, 17
Timber, 448
Tin, 9, 11, 48, 271, 275, 277–278, 280, 338, 350, 351, 353
Tintini, 417
Tiran mountains, 275
Tiz-Lasbela, 11
Tochi, 523, 526
Tochi River, 5
Todio, 413
Togau, 463,
Togau style, 83
Togau B style, 83
Togau D style, 83
Toltec, 436
Tosi, Maurizio, 365
Traghda, 198
Transition Phase, 414, 415, 417
Trench RPR-1, 151, 154
Trianthema, sp., 288, 290, 291
Tripathi, Dr. K.K., 127
Tripuri, 172
Triticum aestivum, 206, 208, 215, 295, 301
Triticum aestivum L., 207
Triticum compactum, 206, 207
Triticum compactum Host, 207
Triticum durum, 301
Triticum mone coccum, 299
Triticum sphaerococcum, 206, 207,

208, 213, 215, 216, 217
Triticum sphaerococcum Perc., 208
Triticum turgidum, 299, 301
Triticum vulgare, 206, 207
Turan, 66, 67
Tukris, 351
Turkey, southern, 500
Turkistan 22, 367; eastern, 11
Turkmenia, 51, 57, 577; South, 56, 57, 63, 64
Turquoise, 9, 11, 82, 83, 271, 273–274, 282, 311, 350
Turkmenistan, 578; southern, 301

USSR, 113, 275
Uaxactum, 429
Udaipur, 11; District, 130, 131
Ulug Depe, 63
Umma, 369
Umm al-Qaiwain, 323
Umm an-Nar, 327, 328, 330, 335, 336, 338, 344, 347, 349, 350, 351, 353; burials, 342; deposits, 331; period, 325; tomb, 325
Unchadih, 396
Unchravriti, 174
United Arab Emirates, 323, 325
Unslipped Ware, 409
Ur, 65, 66, 266, 267, 268, 281, 347, 348, 349, 351, 354, 365, 370–372; Third Dynasty of, 267, 382
Ural, 275
"Urban", 579
Urban Harappan society, 162
Urban Harappans, 24, 563
Urd, 215
Uruk, 61, 62
Utpuria, 131
Uttar Pradesh, 12, 20, 26, 34, 53, 56, 57, 129, 135, 163, 168, 216, 218; Western, 23, 25, 53, 93, 125, 128, 130, 215, 218, 383, 396, 407, 408, 409, 413, 418, 450, 576

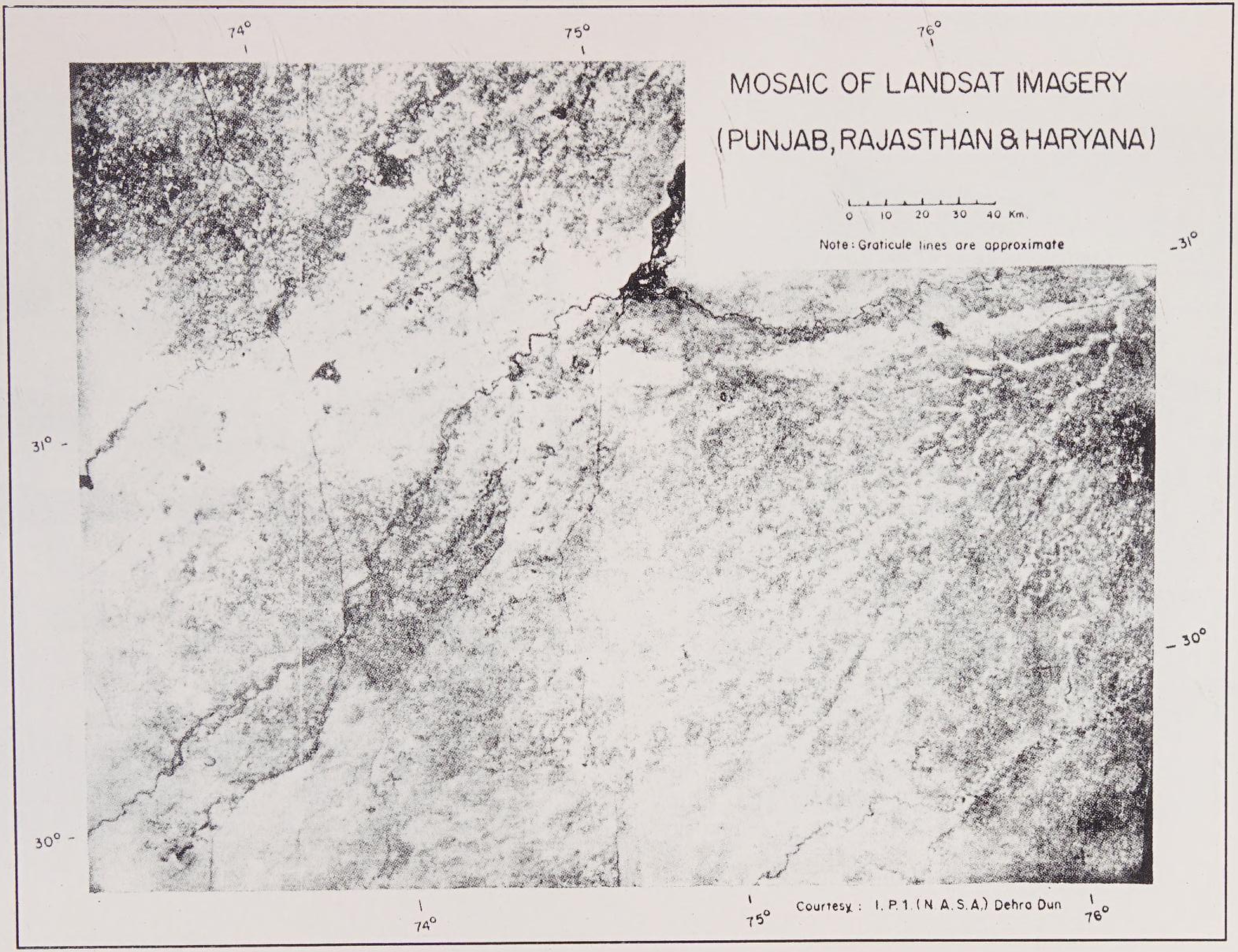
Vadgam, 168
Vaged, 198
Vainiwal, 261
Vaishnavism, 391
Vandiver, Pamela, 511
Vanprasthas, 174
Varanus, 173
Vasco da Gama, 555
Vats, Pandit Madho Swarup, 15, 55, 141, 168, 469, 472, 508
Vatsa, 57
Venivadar, 417
Verstappan, H.T., 225
Vidale, Massimo, 482, 511
Vigna mungo, 215
Vinayadhikarana, 167
Vindhyas, 113
Vrijii, 57
Vyarna, 37

Wadi Jizzi, 344
Wadi Suq, 330, 336; period, 325, 330; tradition, 330
Wahinda, 5
Waryah, Abdullah, 461
Water buffalo, 423, 502, 504, 513
Webb, M.C., 435
Weber, S.A., 287, 292, 450
Weisgerber, G., 328, 346, 352
West Bengal, 137, 237
Western Ghats, 20
Western highlands, 3
Wheat, 111, 183, 206, 207, 213, 215, 216, 217, 218, 295, 299, 301, 303, 376, 573
Wheat grain, modern, 207
Wheeler, Sir Mortimer, 22, 64, 79, 97, 101, 223, 236, 366, 469, 472, 481, 482, 490, 492, 548
White microbeads, 239, 241, 242
White Painted Black and Red Ware, 214, 218, 240
Wild boar, 304
Wild Grass, 214
Willey, G.R., 437
Wolley, Sir Leonard, 266, 365, 372
Woshm, 328
Wright, Rita, 501, 511
Wynaad, 275

Xunantunich, 434

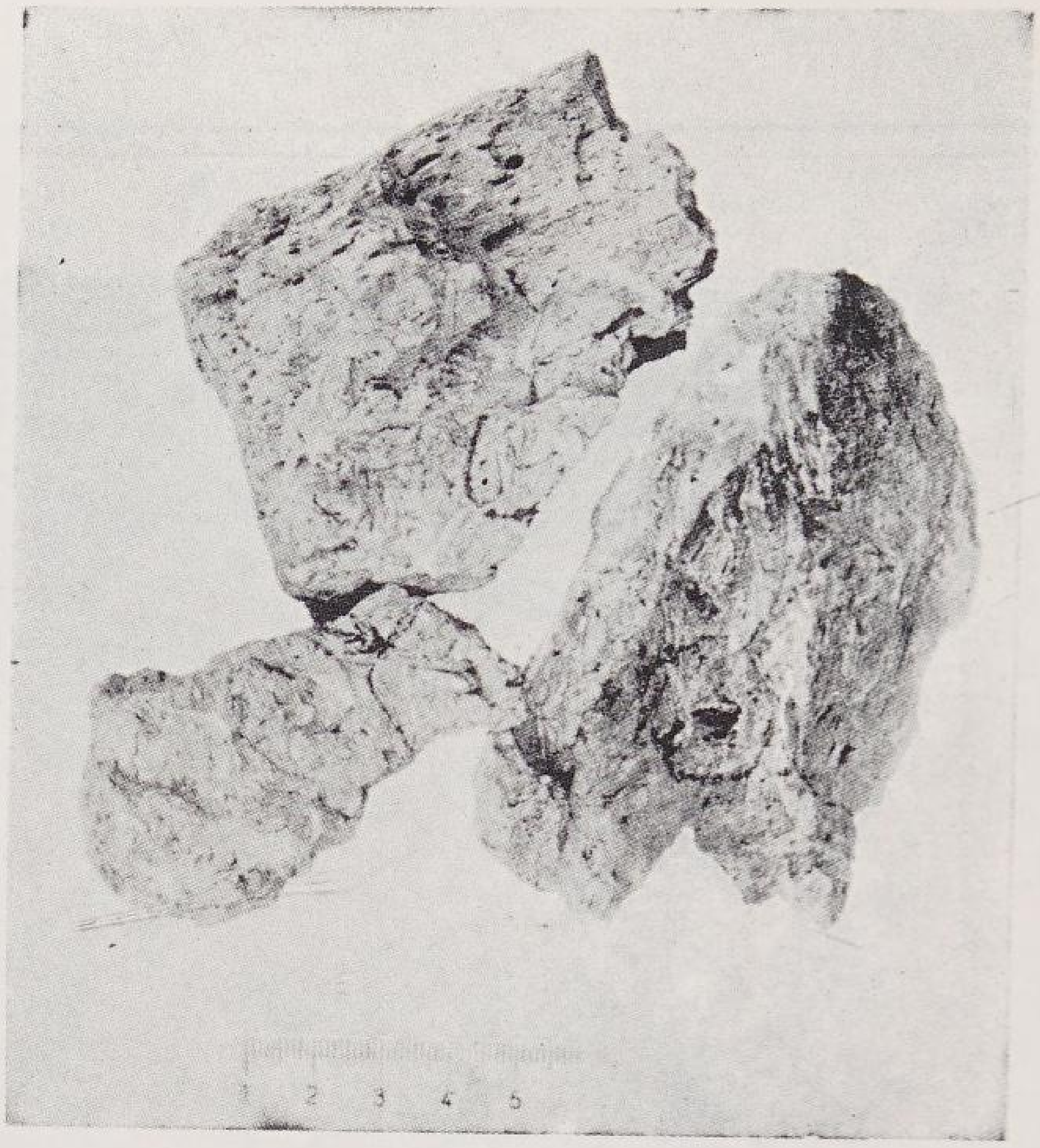
Yaha *see* Tepe Yaya
Yamuna, 5, 12, 93, 114, 130, 226, 229, 245, 248, 397, 417
Yamuna Nagar, 52
Yamuna Valley, 52, 406, 407, 408, 409
Yaxchilan, 431
Yazd, 274, 280
Yazman, 91, 94
Yellow Fever, 434
Yemen, 352
Yucatan, 432, 336
Yucatan Peninsula, 427, 430, 432, 437

Zagros, 311, 352
Zahedan, 276, 311
Zawar mines, 280
Zebu, 311, 312, 352, 503, 513
Zekda, 168, 170, 171, 172, 174, 239, 240, 241, 413, 417
Zhob, District, 274; River, 5; Valley, 90, 161, 263
Zizyphus, 290, 301
Zupadi parnakuti, 170
Zurich, 477
Zyzyphus jujuba Mill, 206
Zyzyphus mauritiana Lam, 206
Zyzyphus nummularia, 206


MOSAIC OF LANDSAT IMAGERY
(PUNJAB, RAJASTHAN & HARYANA)
0 10 20 30 40 Km.
Note: Graticule lines are approximate
74°
75°
76°
31°
30°

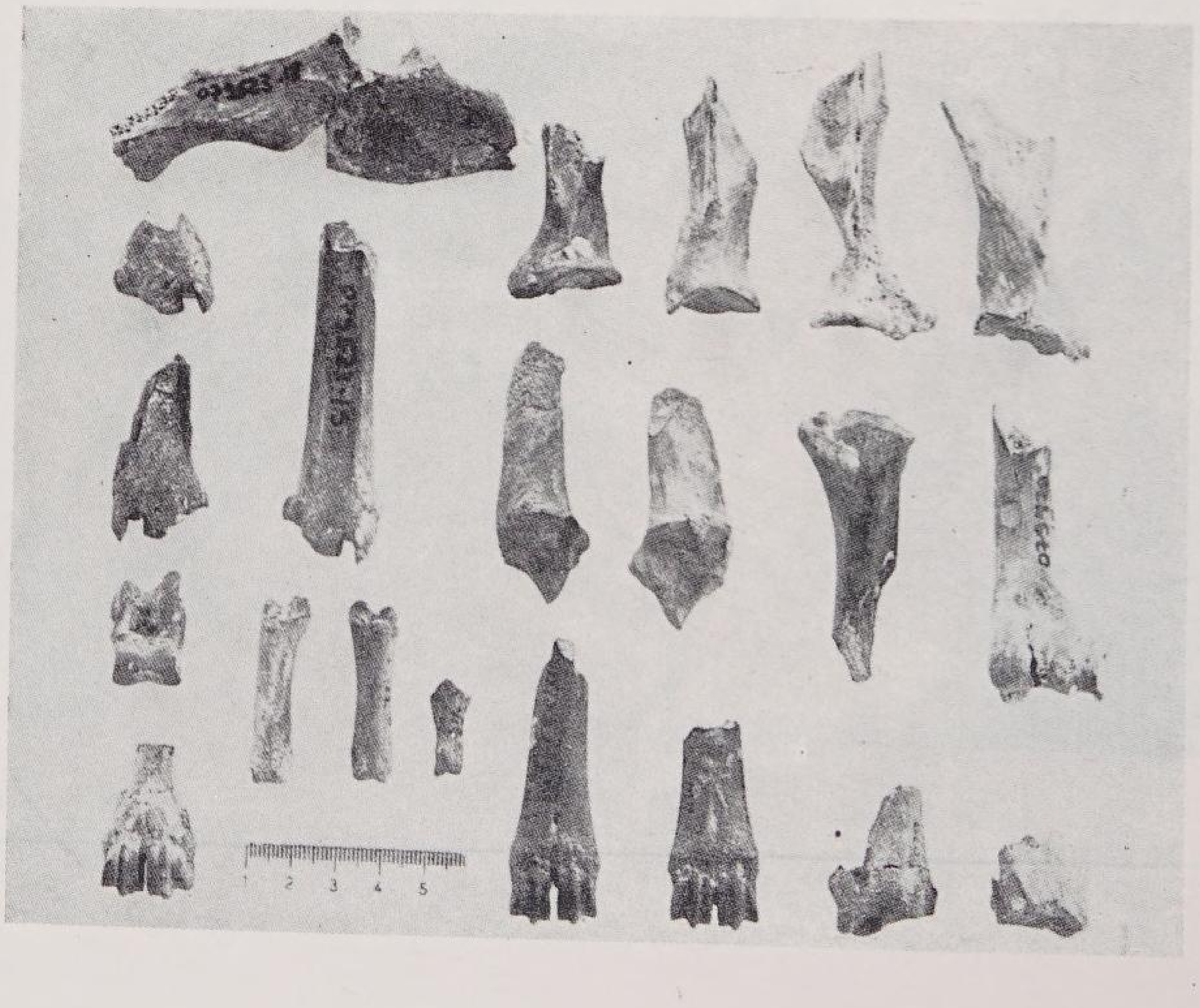
Courtesy : I. P. 1. (N. A. S. A.) Dehra Dun

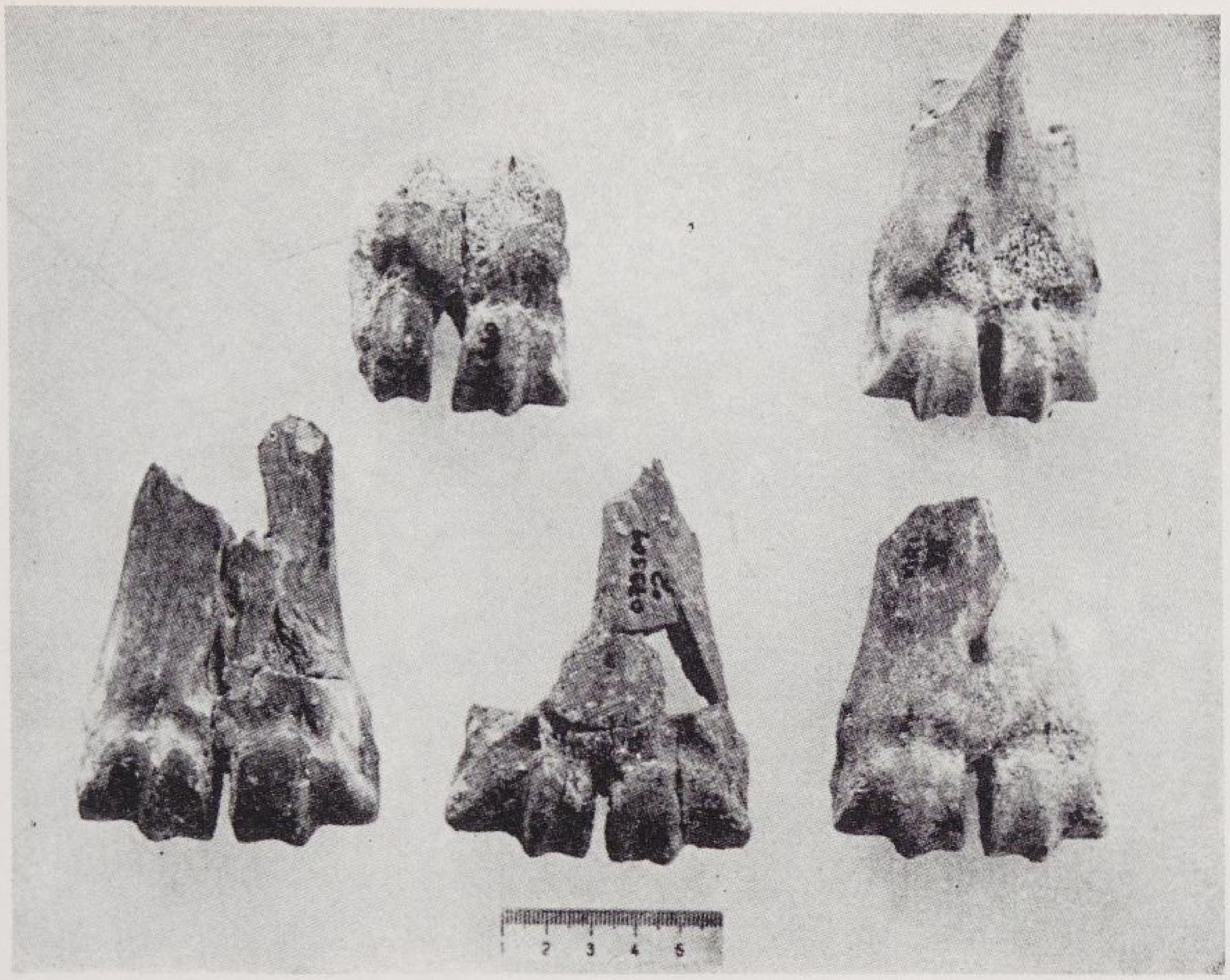
P1. 1. Mosaic of Landsat imagery (Punjab, Rajasthan and Haryana).



Pl. 6.1. Imprints of barley on clay from MR. 3 Neolithic. Sixth millennium.

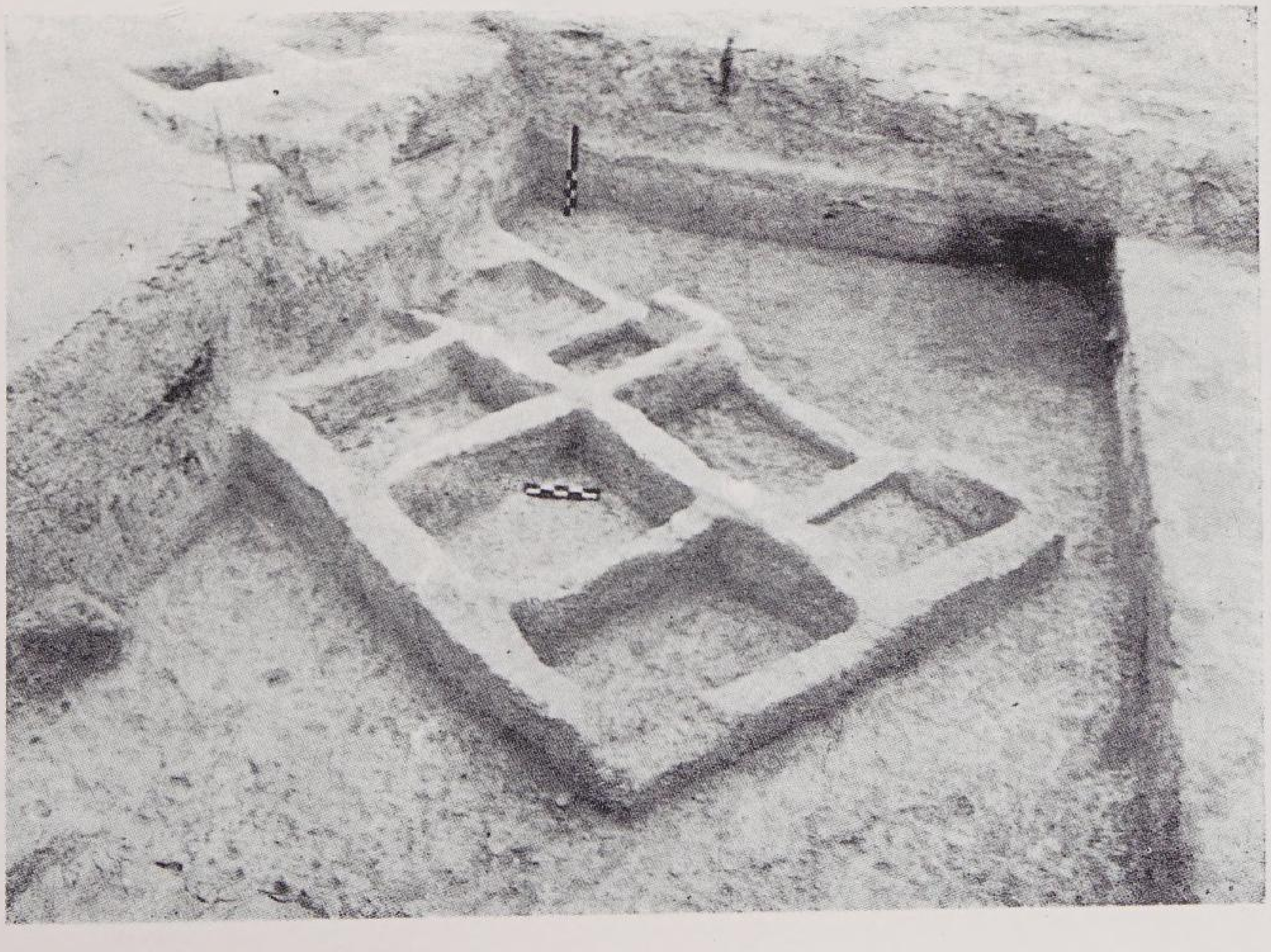
Pl. 6.2. Gazelle bones from MR. 3 Neolithic. Sixth millennium.

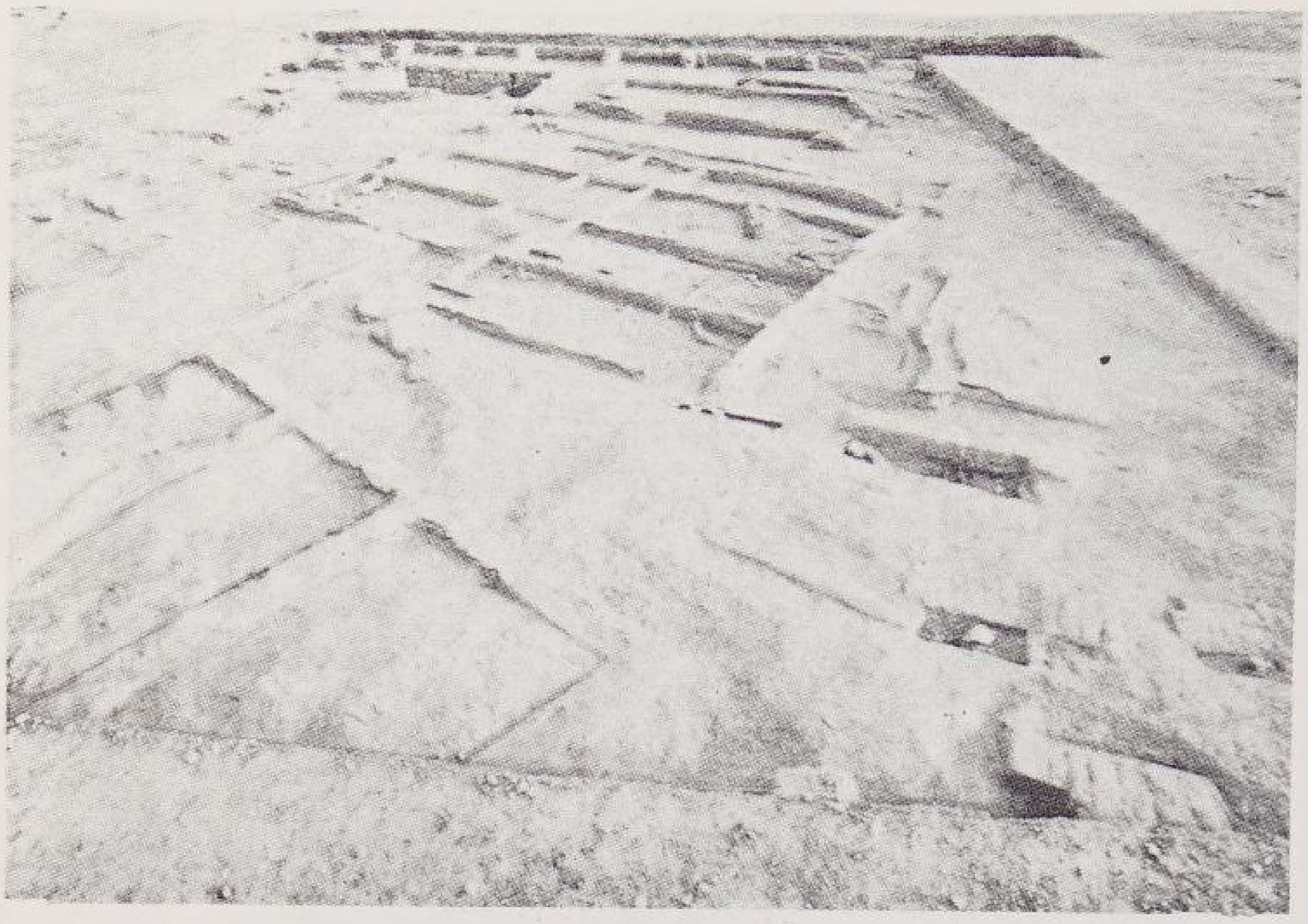




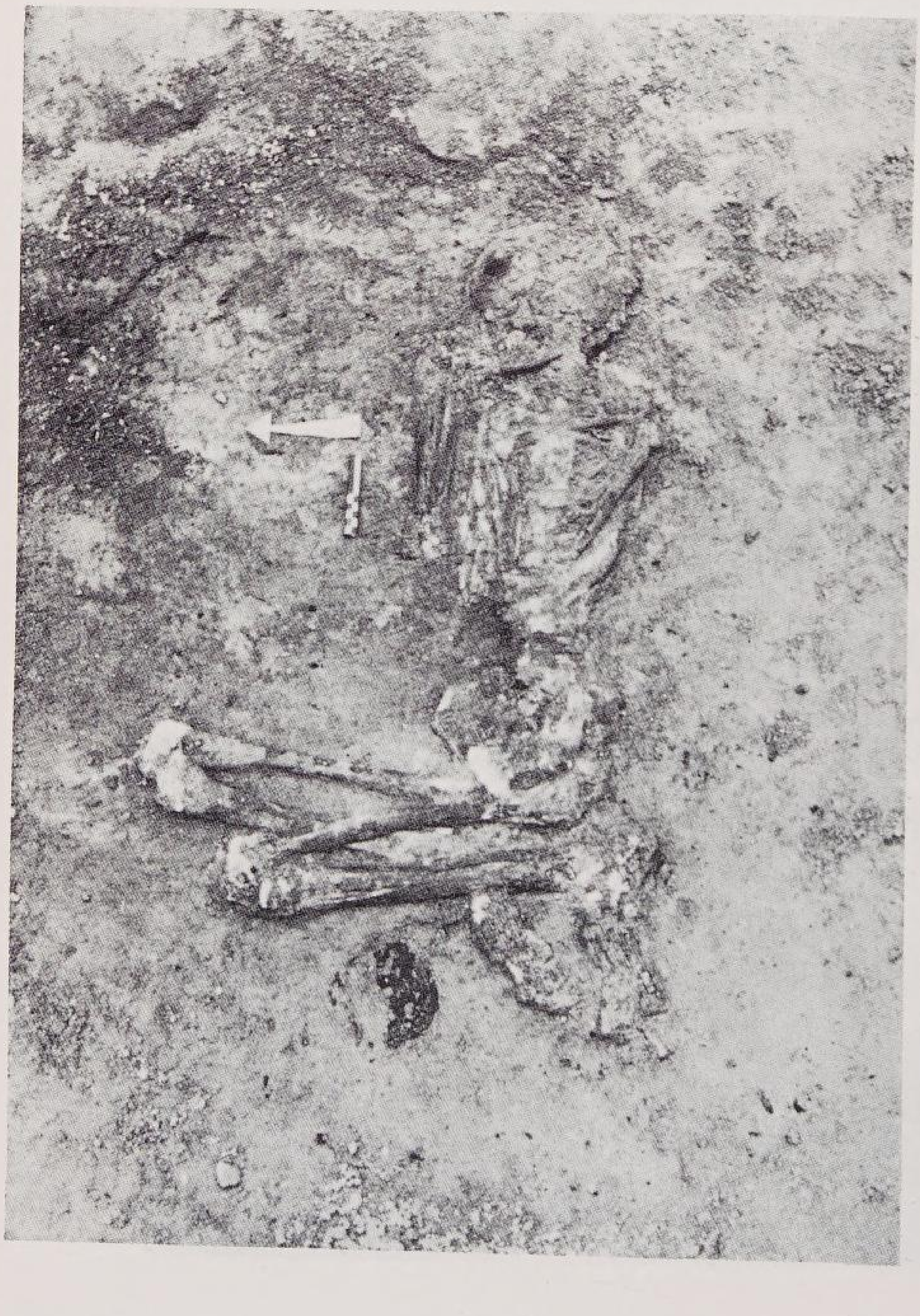
Pl. 6.3. Cattle (Bos) bones from MR. 3 Neolithic. Sixth millennium.

Pl. 6.4. Storeroom from MR. 3 Neolithic. Sixth millennium.

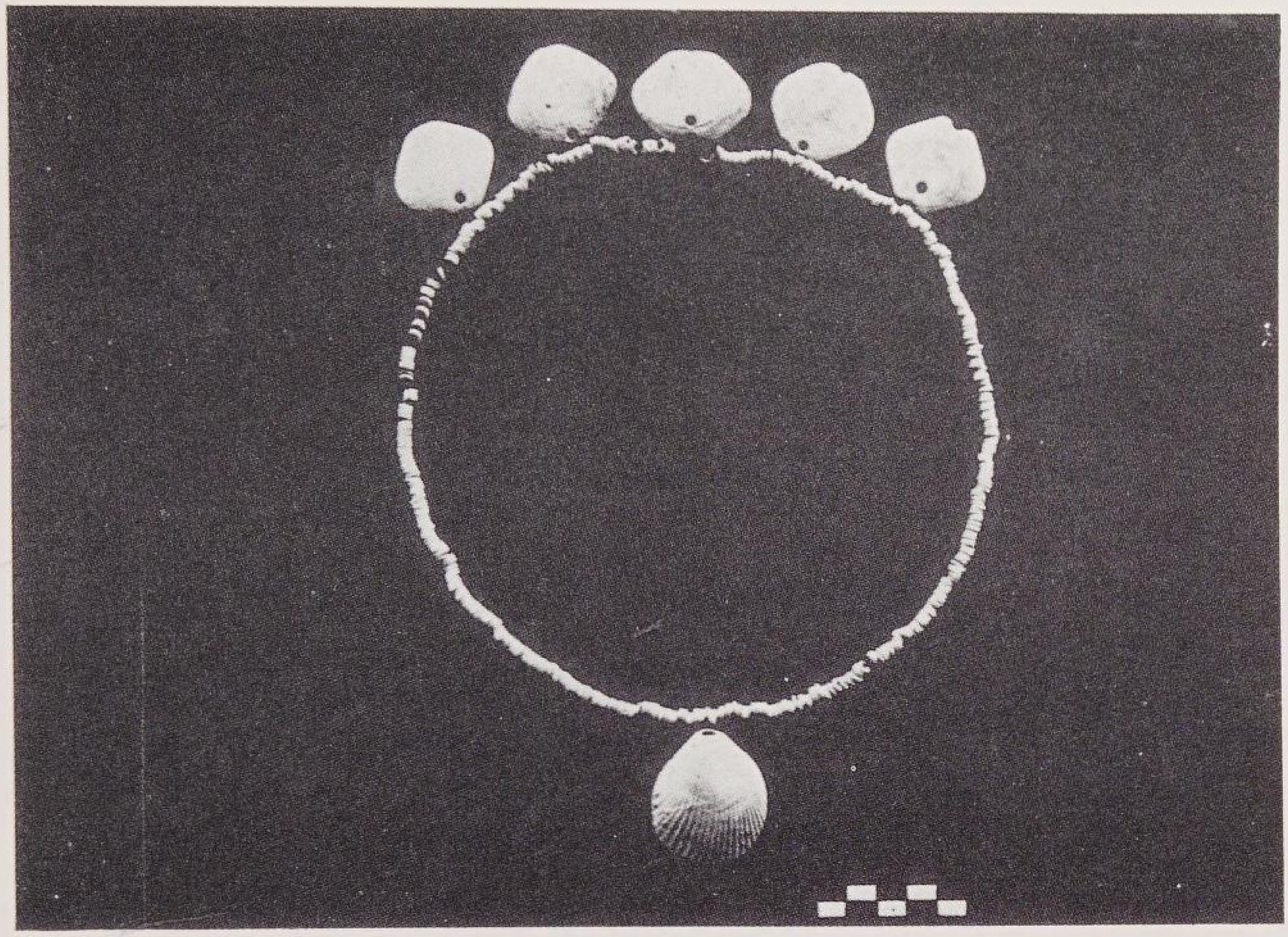




Pl. 6.5. General view of the upper level of MR. 3 with burials on the right side of the foreground. MR. 3 Neolithic. ca. 5000 B.C.

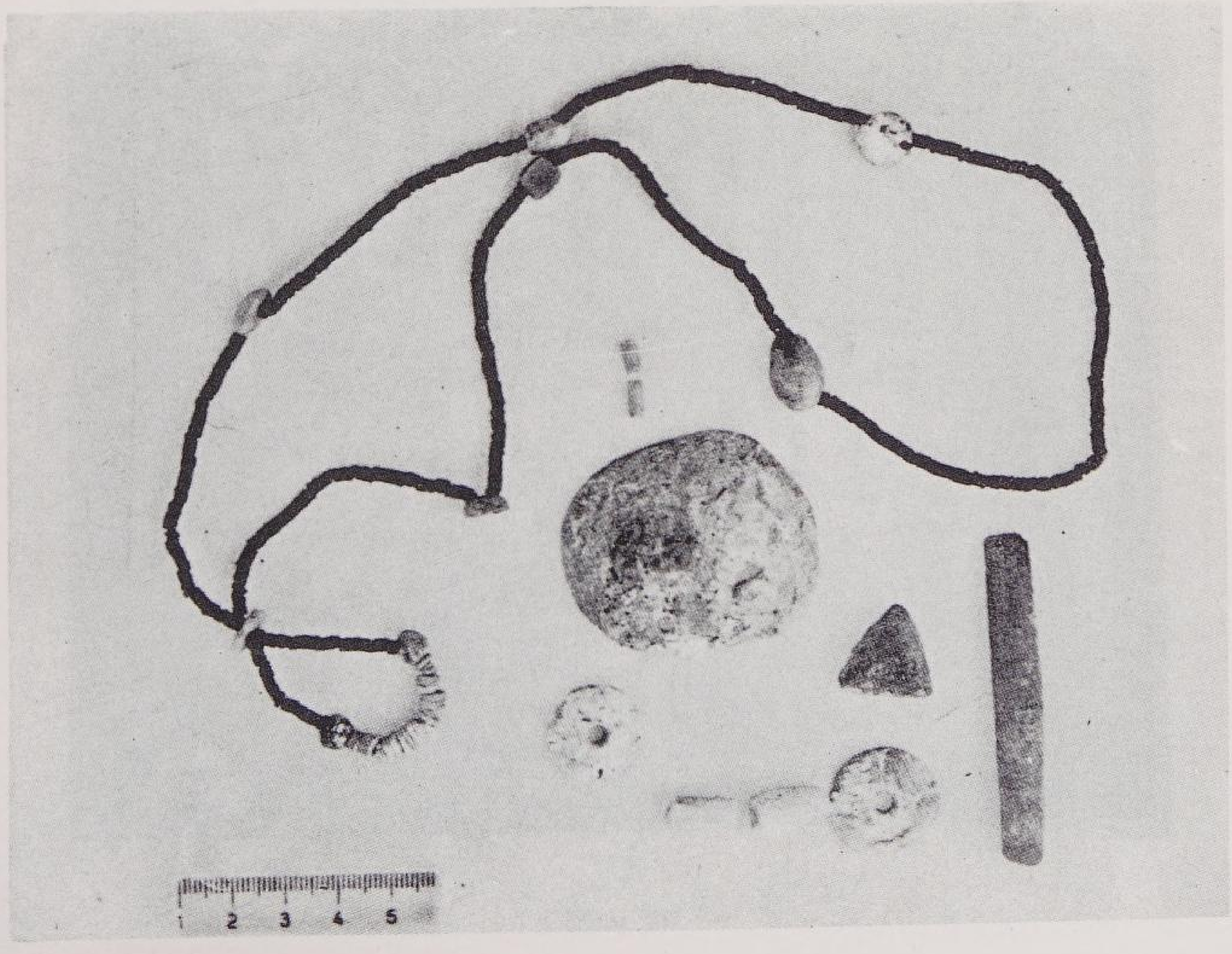


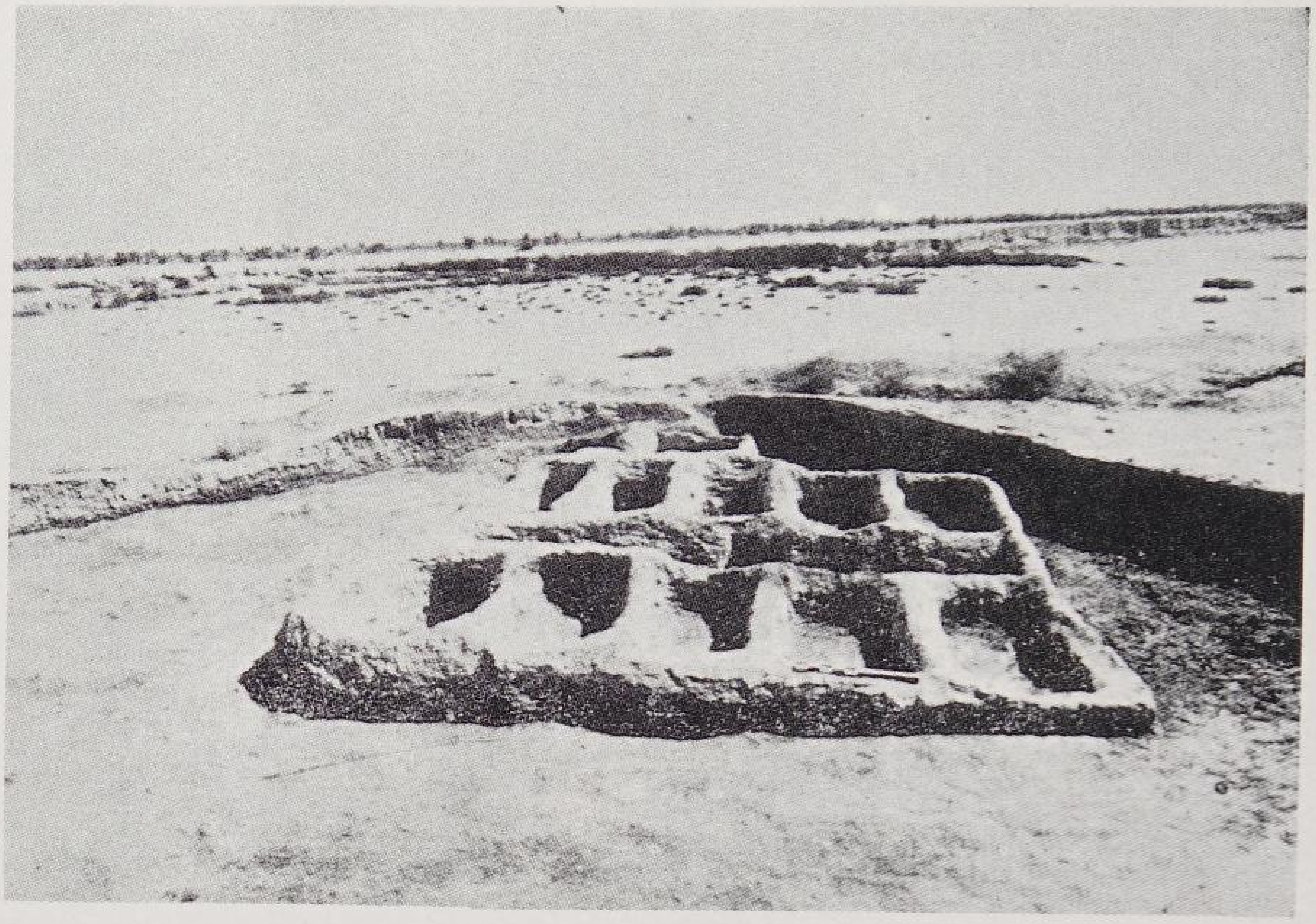
Pl. 6.6. Skeleton from MR. 3 with a basket coated with bitumen. Sixth millennium.



Pl. 6.7. Belt from a grave of MR. 3 Neolithic. Sixth millennium.

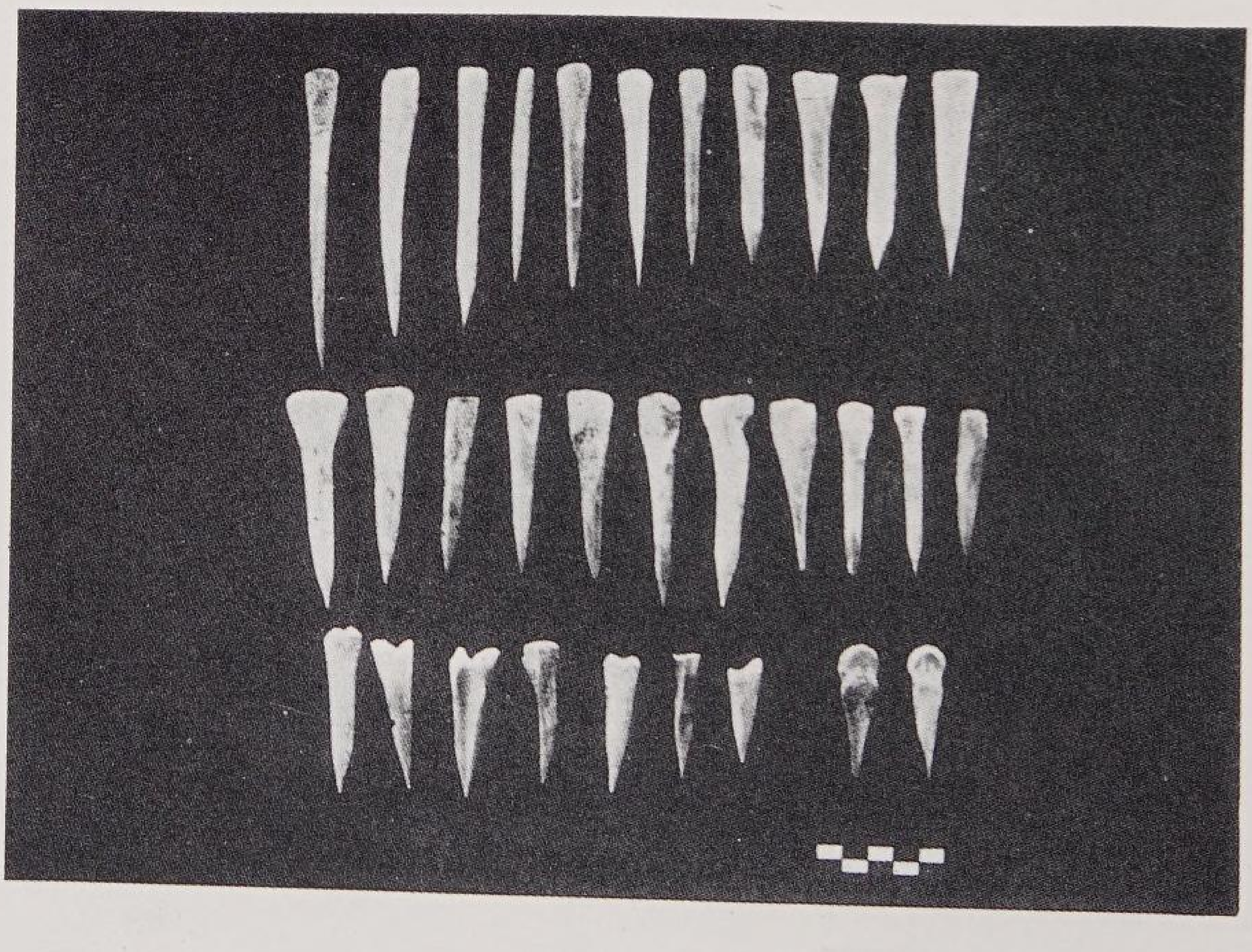
Pl. 6.8. Grave goods from a grave of the upper level of MR. 3 Neolithic, including a necklace with beads of steatite and turquoise.

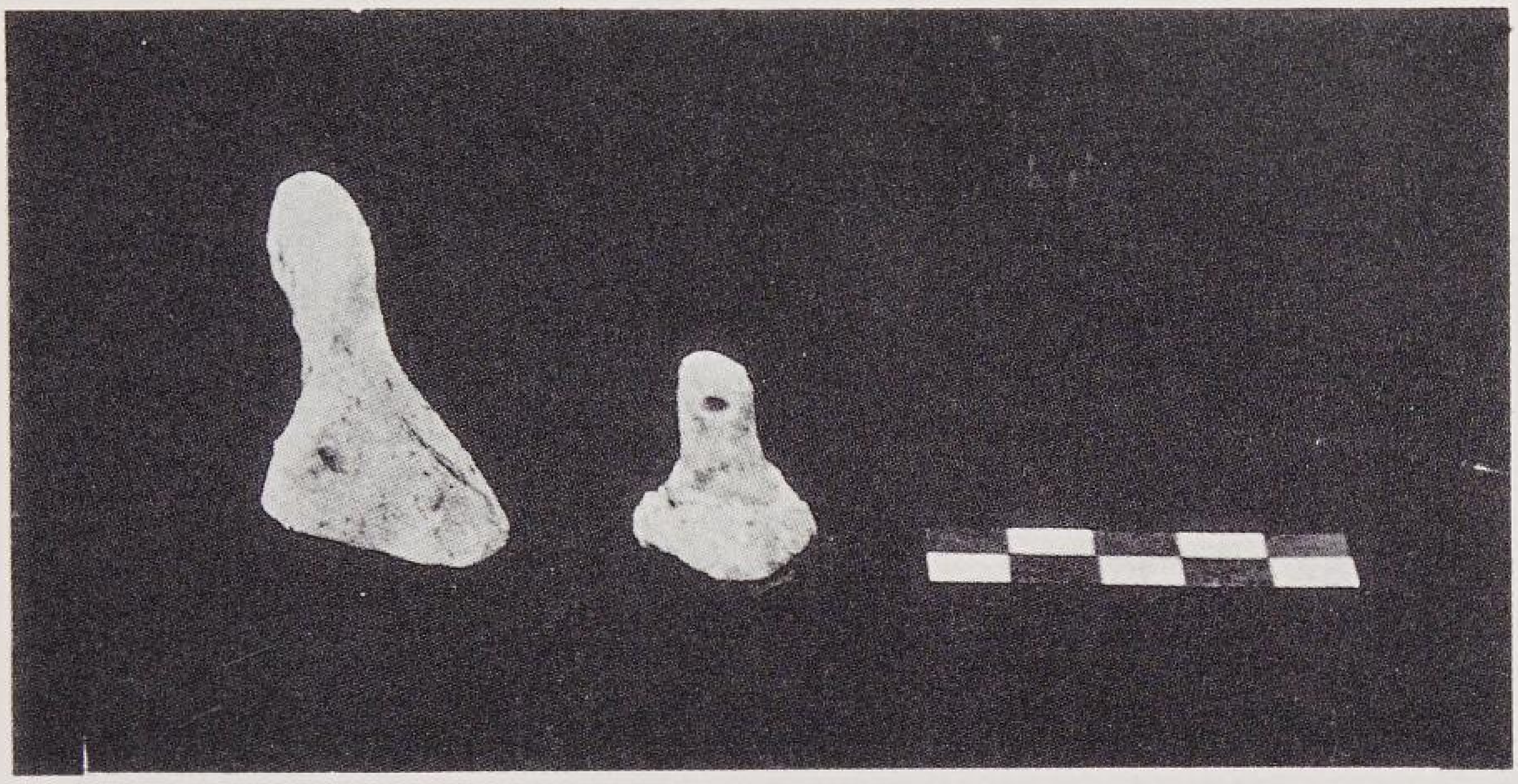




Pl. 6.9. A "granary" in MR. 4. Fifth millennium.

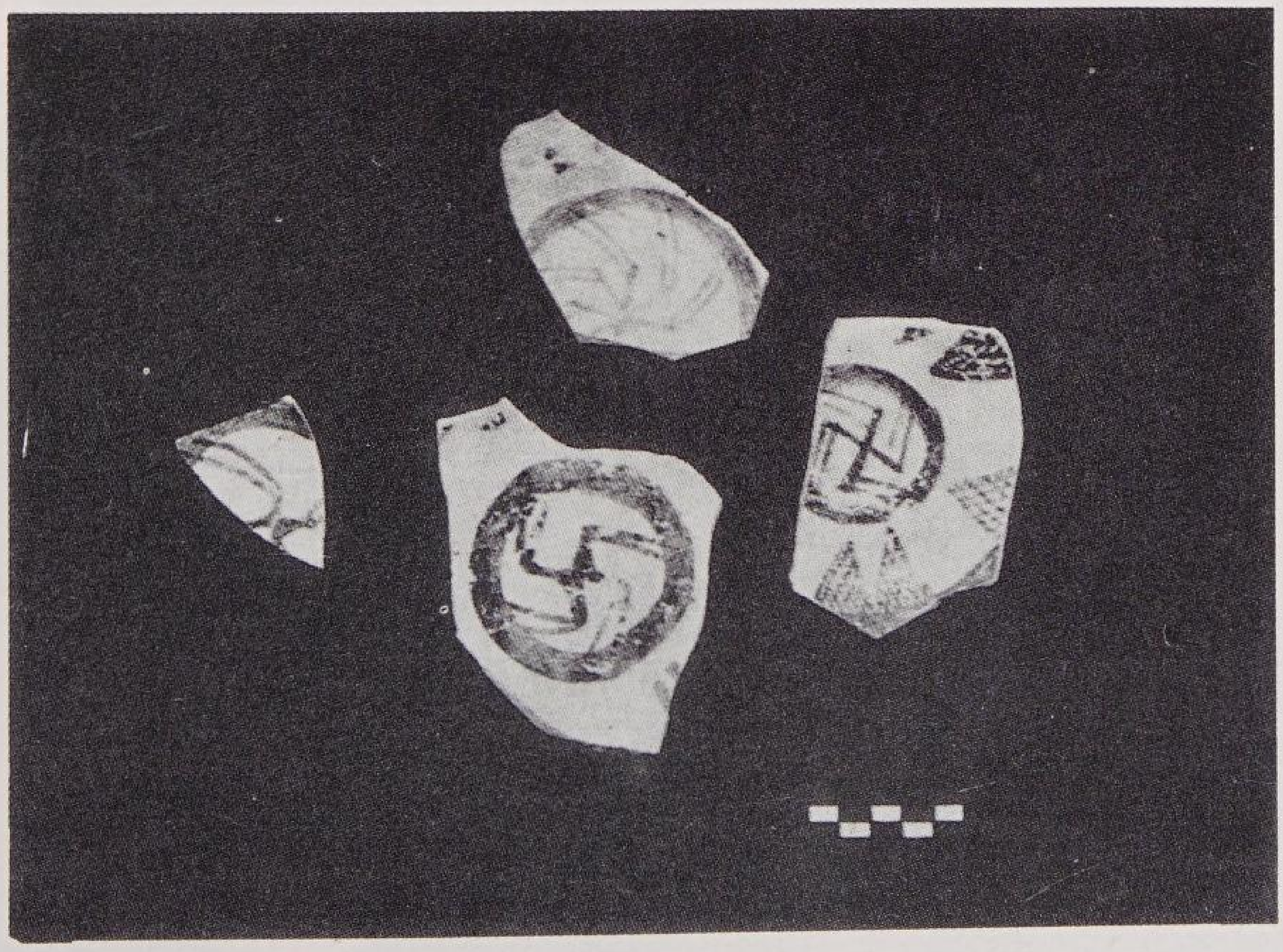
Pl. 6.10. Bone awls from MR. 4. Fifth millennium.

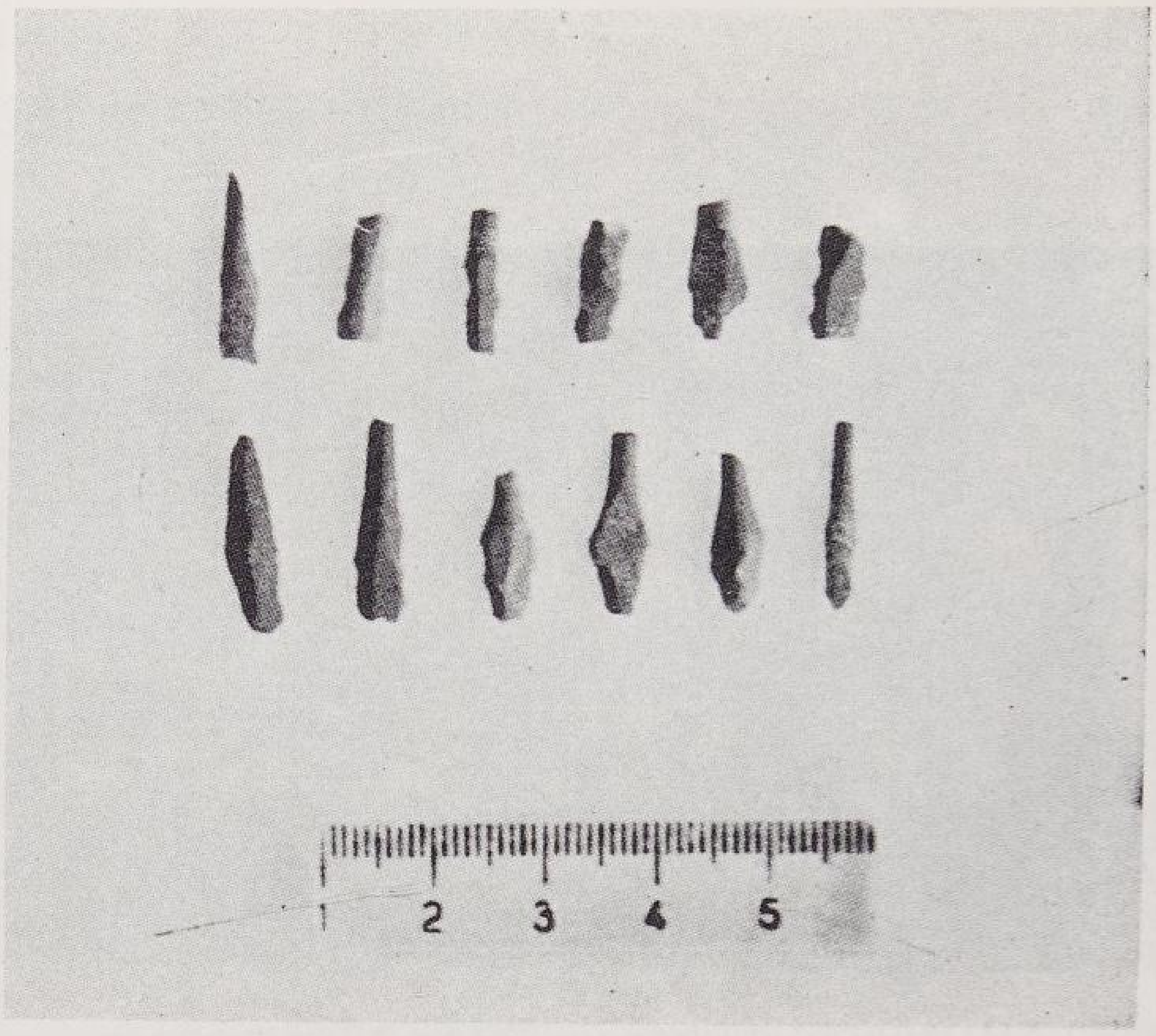




P1. 6.11. Two human figurines in clay from MR. 4. Fifth millennium.

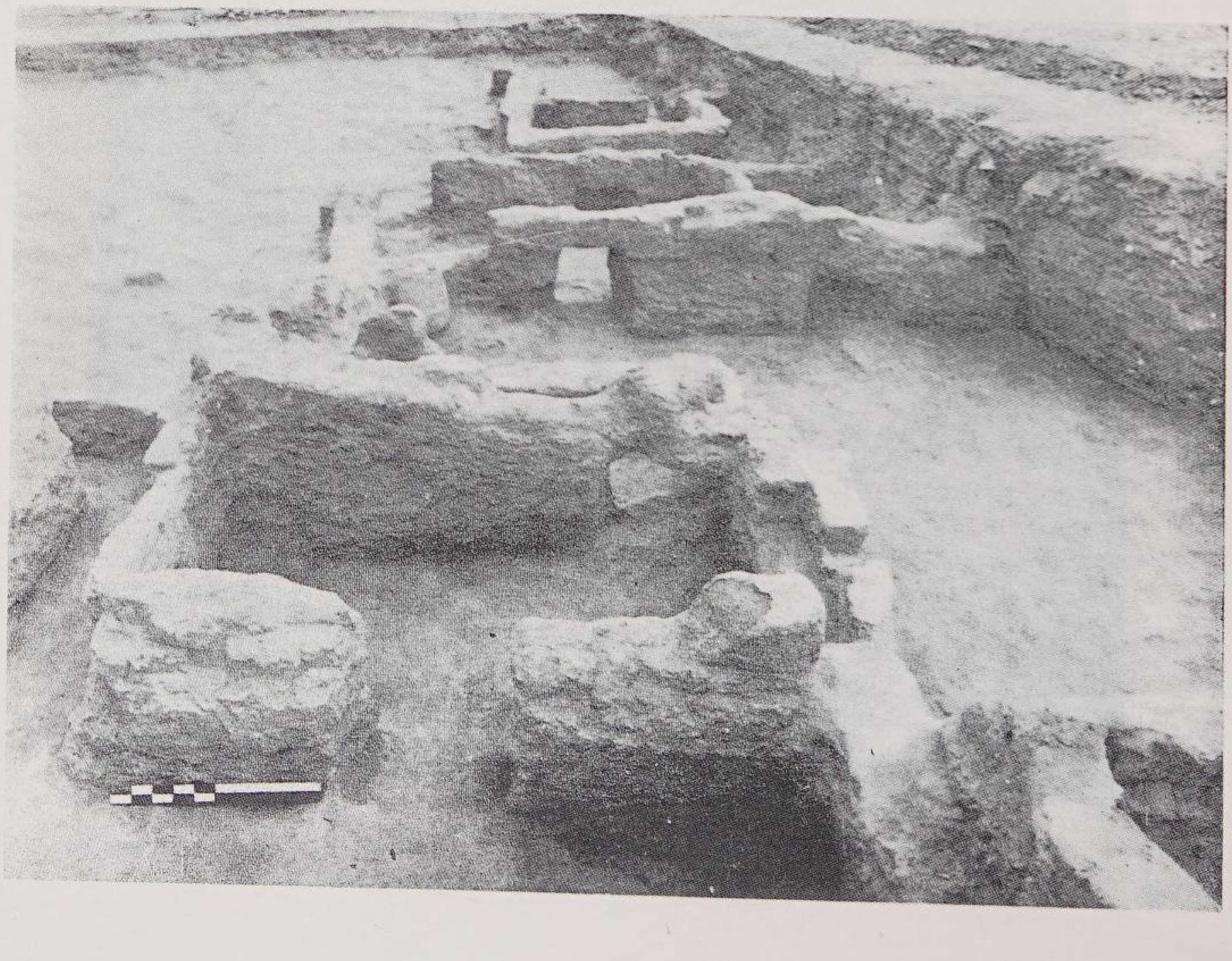
P1. 6.12. Painted potsherds from MR. 2. First half of the 4th milllennium.

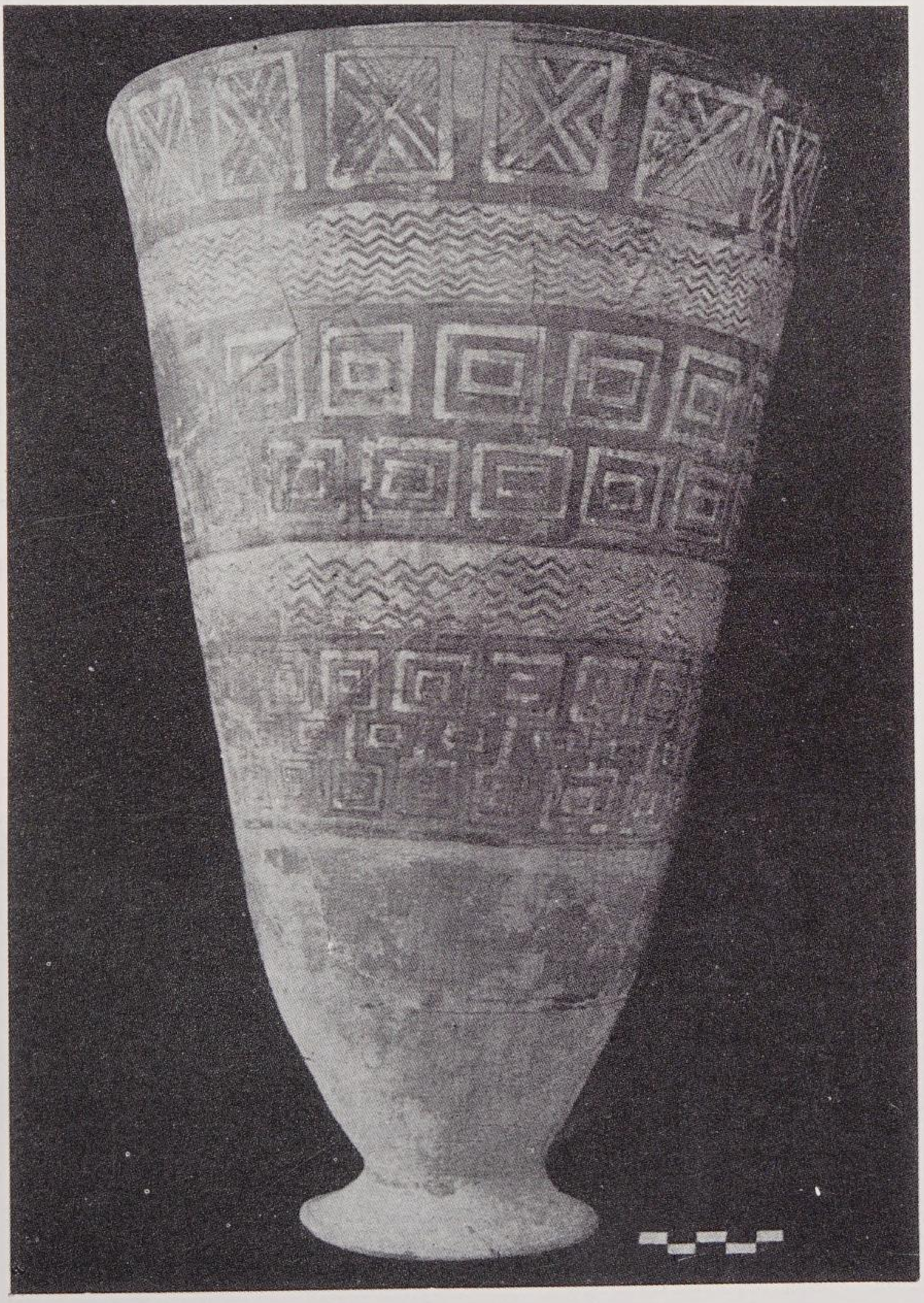




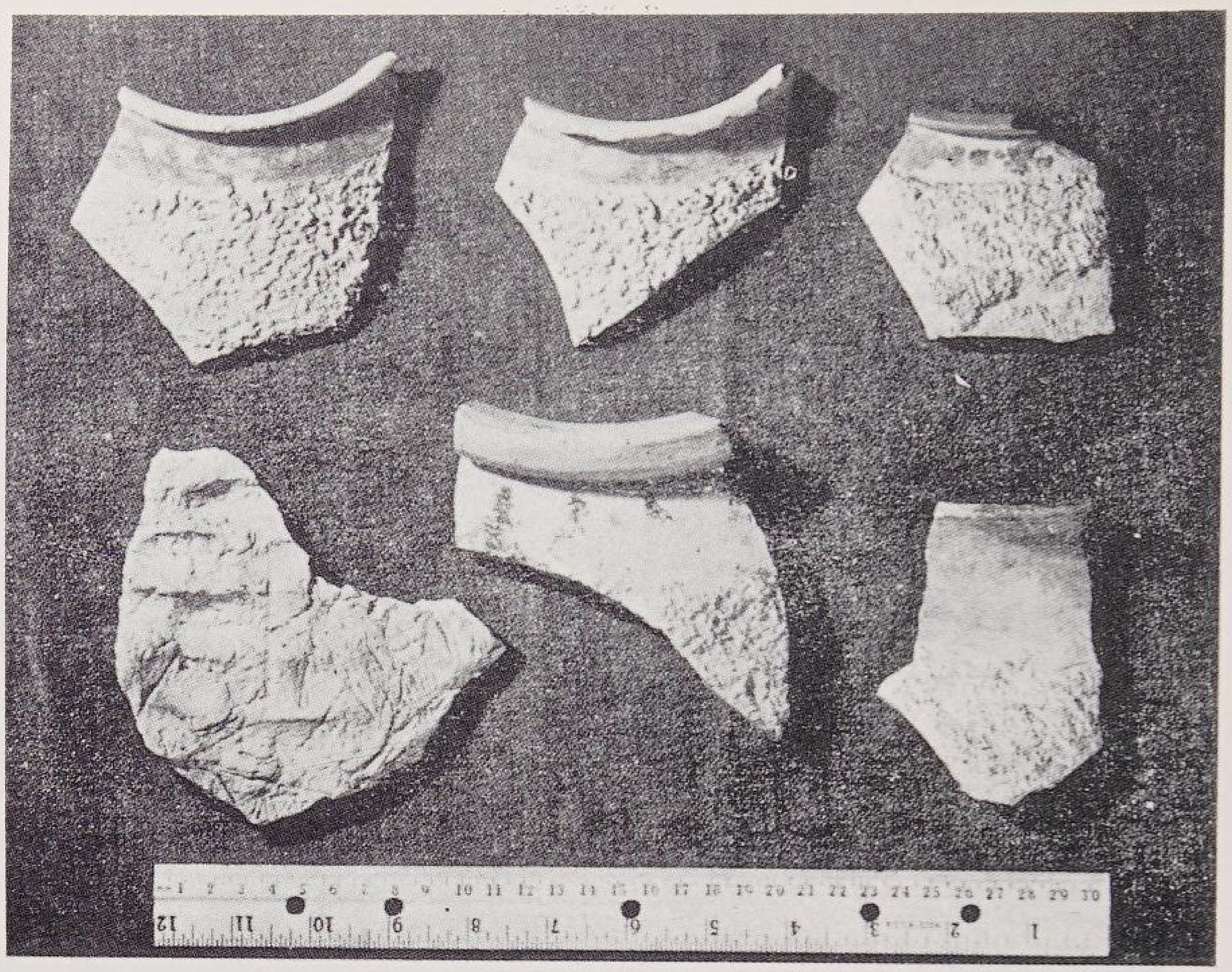
Pl. 6.13. Drills of phtanite. MR. 2. First half of the 4th millennium.

Pl. 6.14. Buildings in MR. 1. Period IV. ca. 3500 B.C.



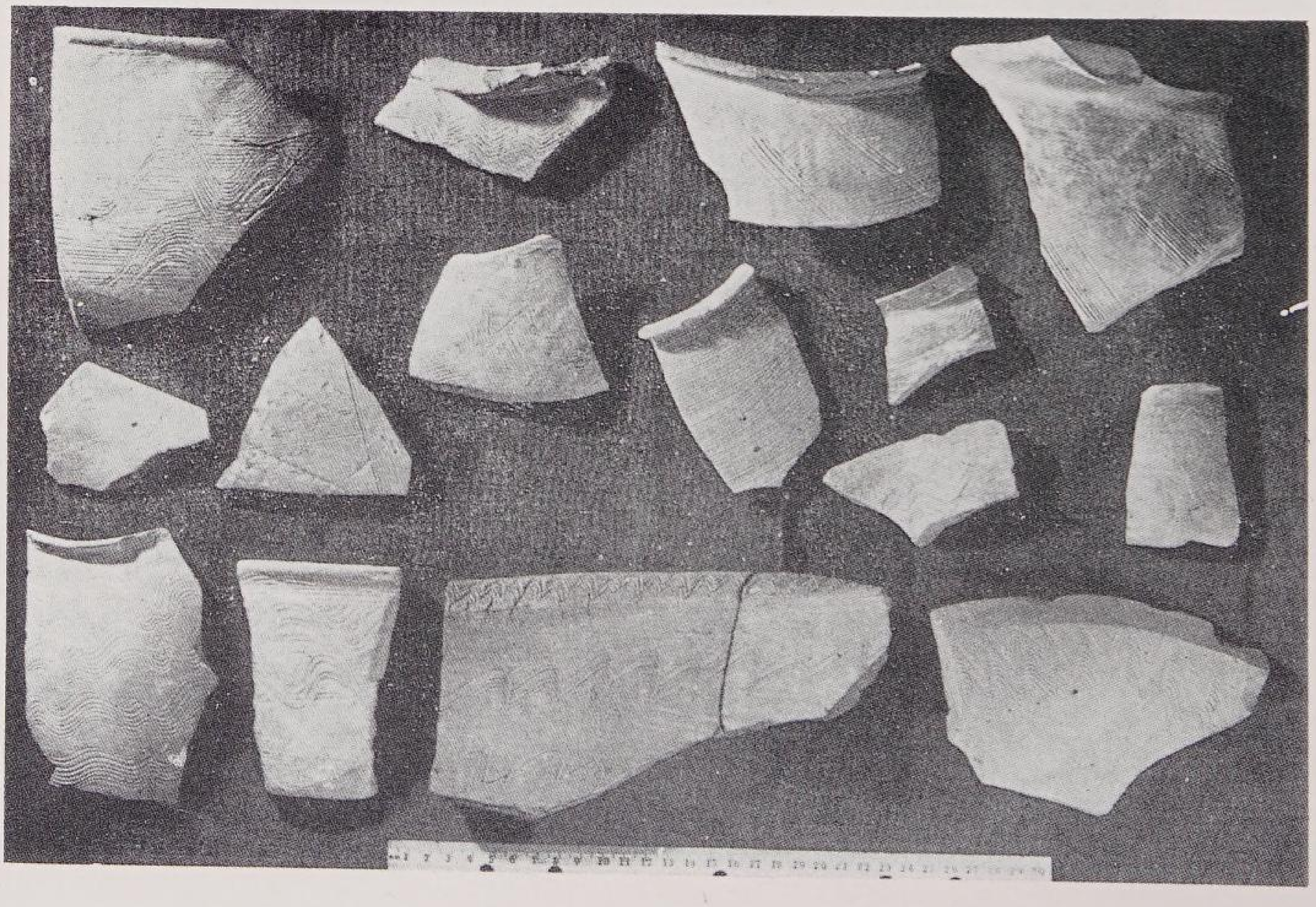


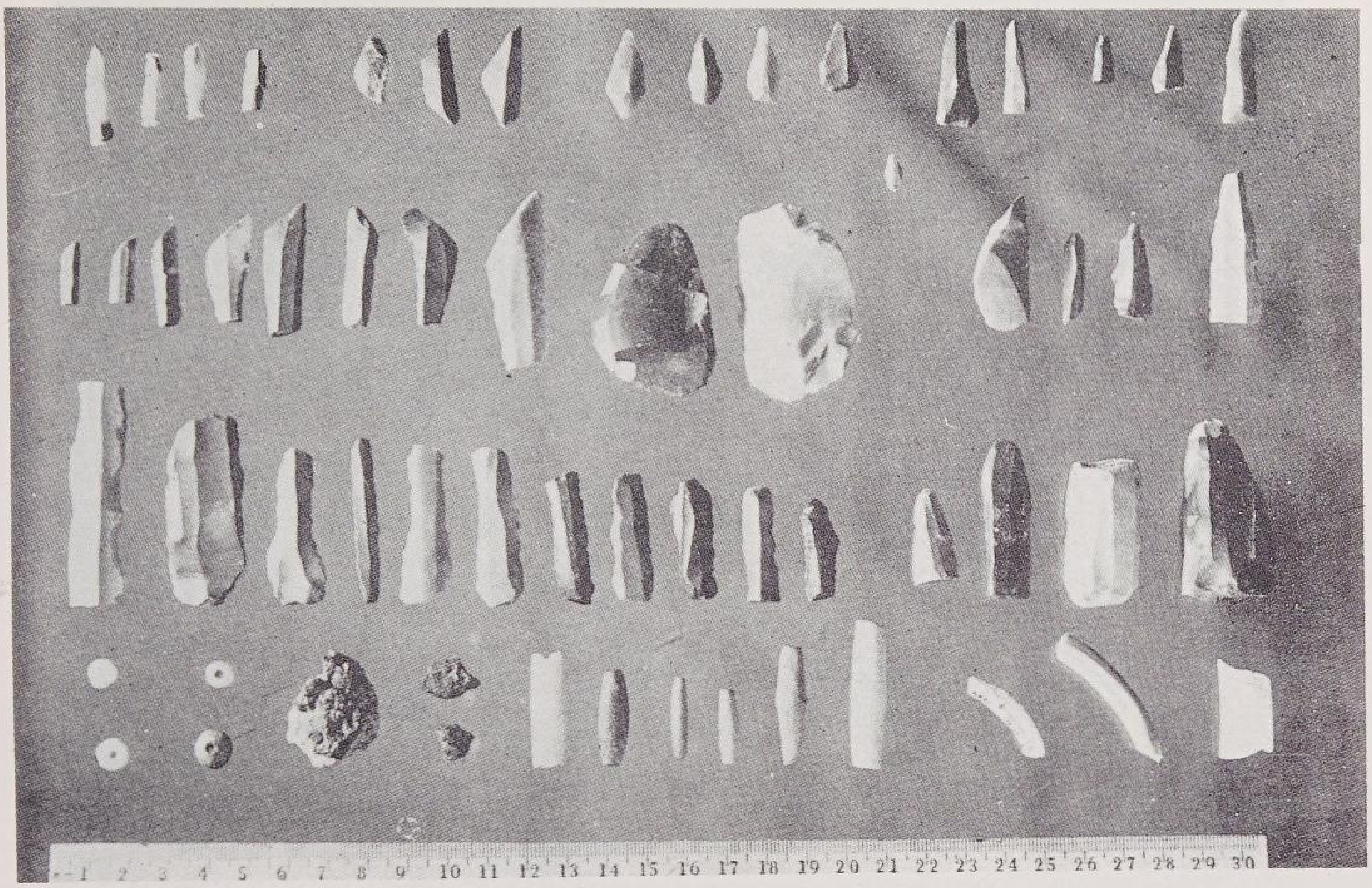
Pl. 6.15. Polychrome vessel from MR. 1. Period IV. ca. 3500 B.C.



Pl. 7.1. The Hakra Wares. Mud applique pottery with painting in black on red or chocolate slip near the neck. Straw marked disk (extreme lower left) has finger impressions.

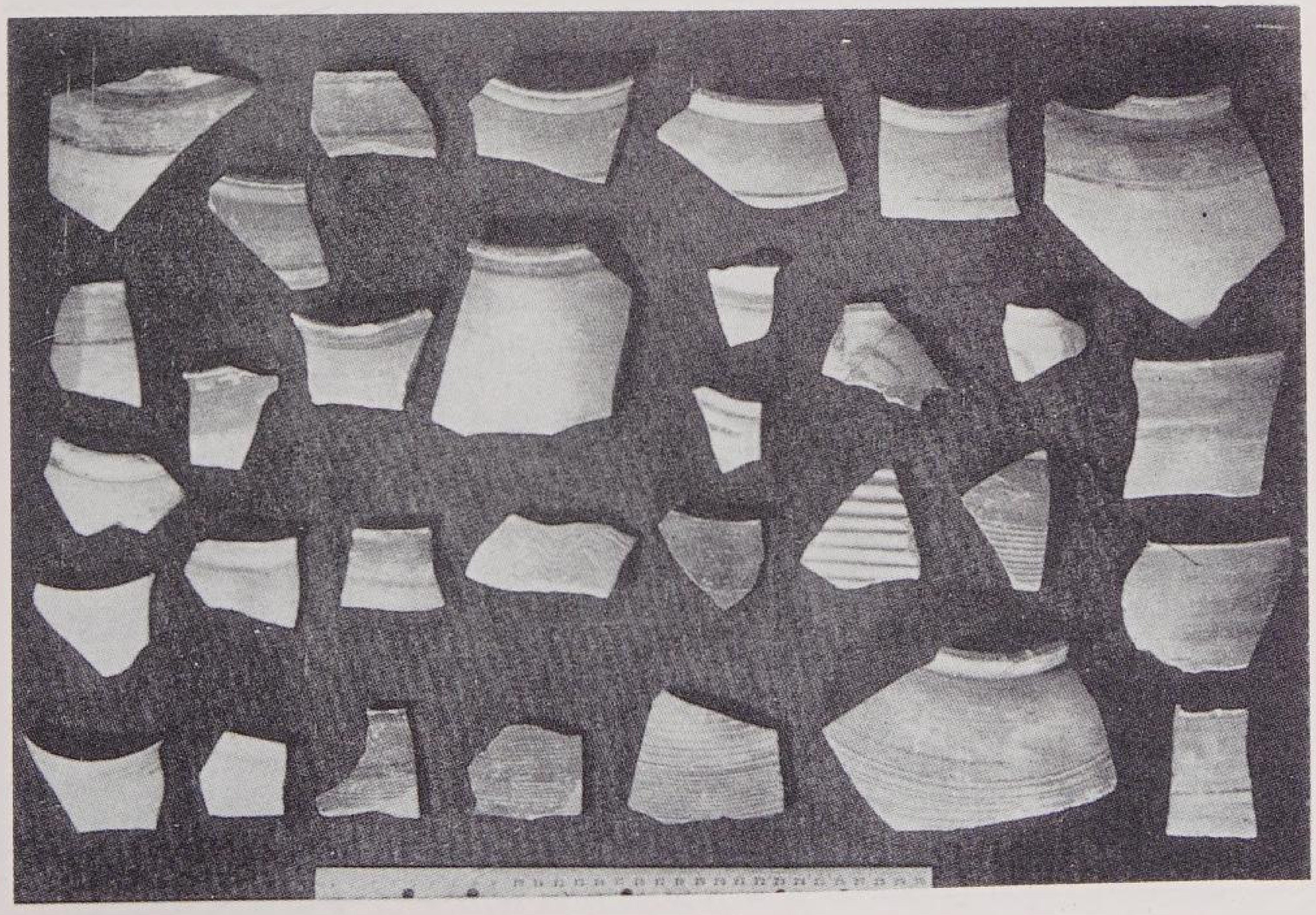
Pl. 7.2. The Hakra Wares. Surface treated with multiple incised lines.

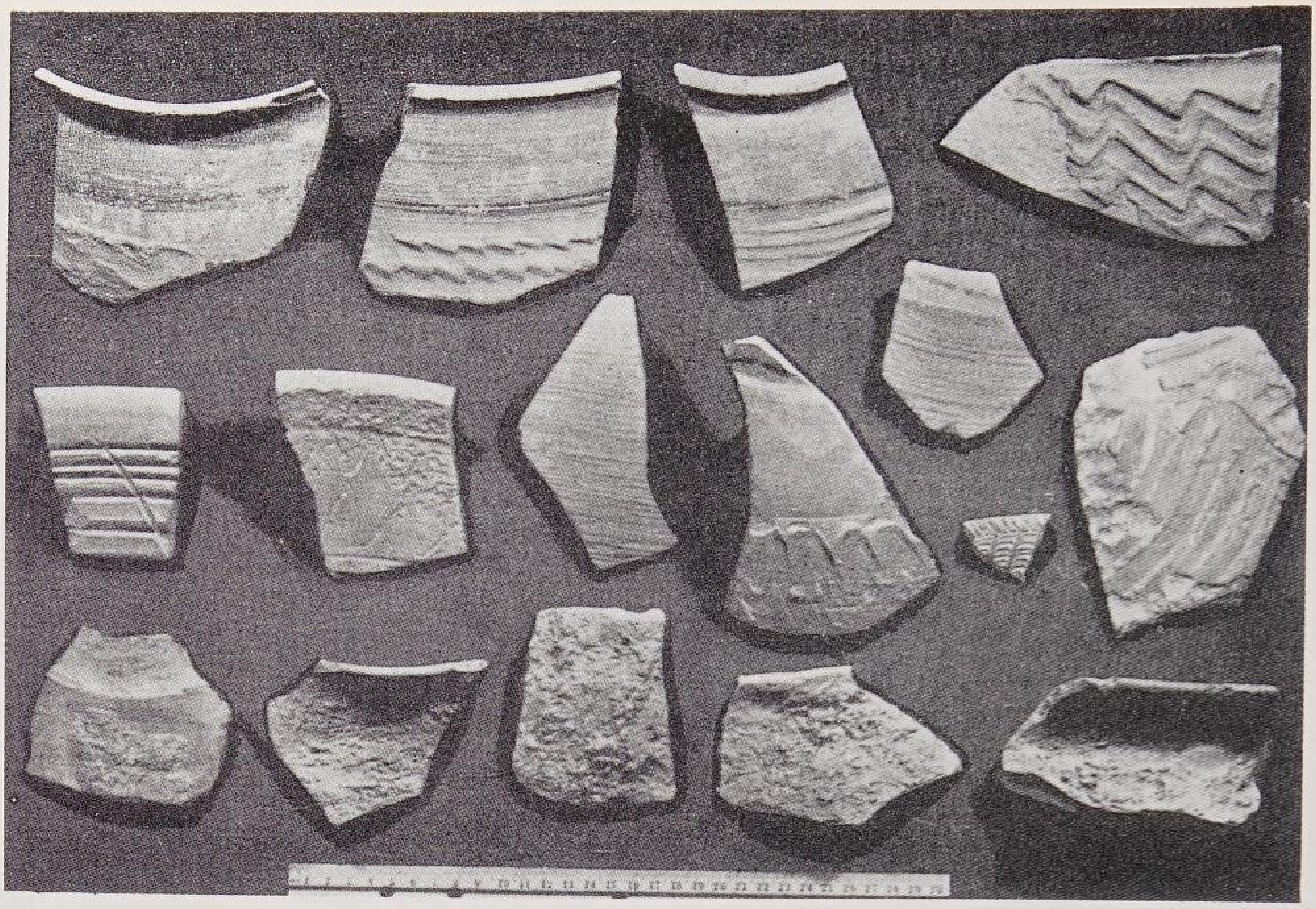



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Pl. 7.3. The lithics associated with the Hakra Wares including (from the left in the lowest row) stone beads, copper, cylindrical beads of stone and terracotta and shell bangle pieces.

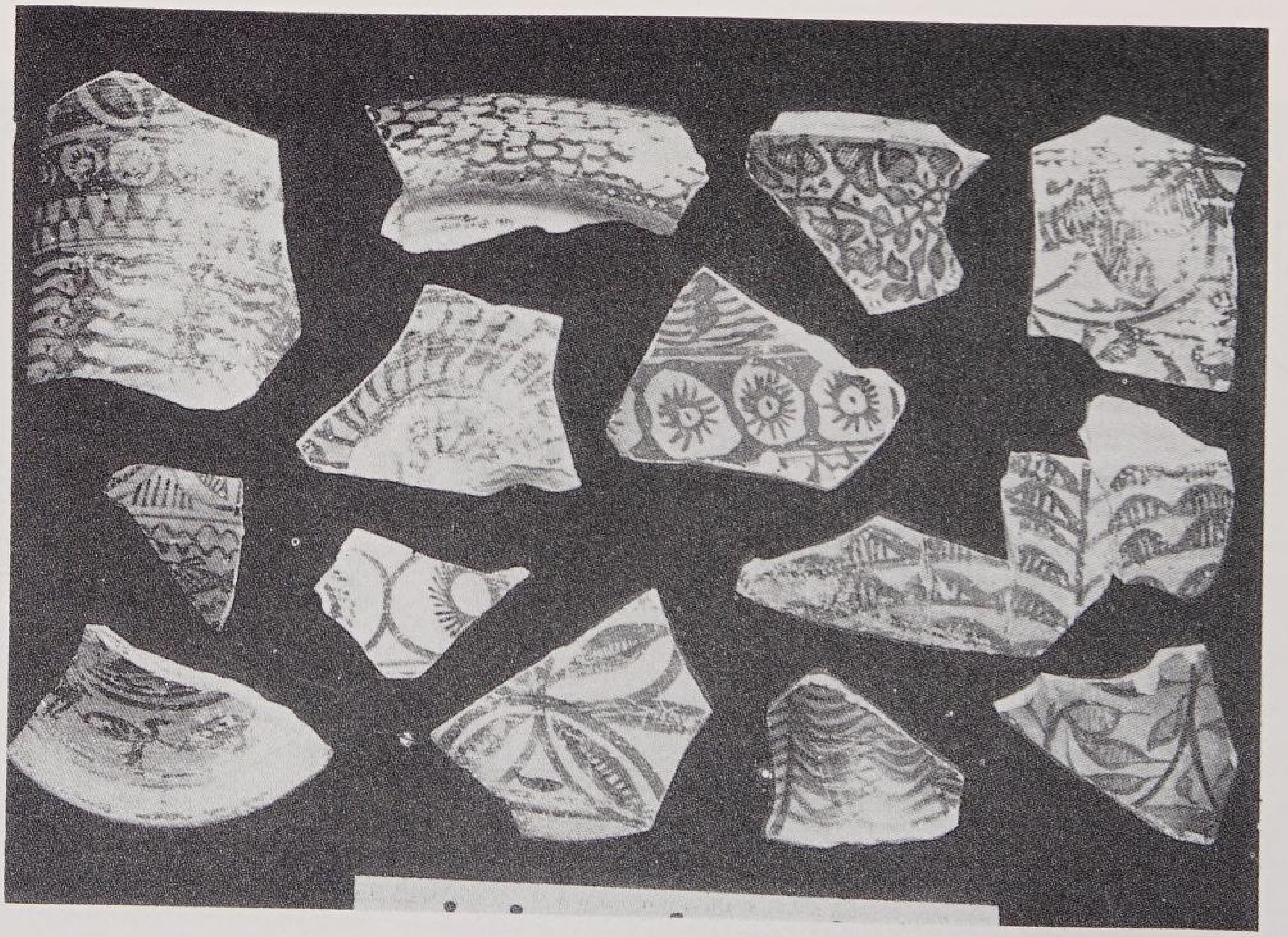
Pl. 7.4. Pottery of the Early Harappan (Kot Dijian) Period.

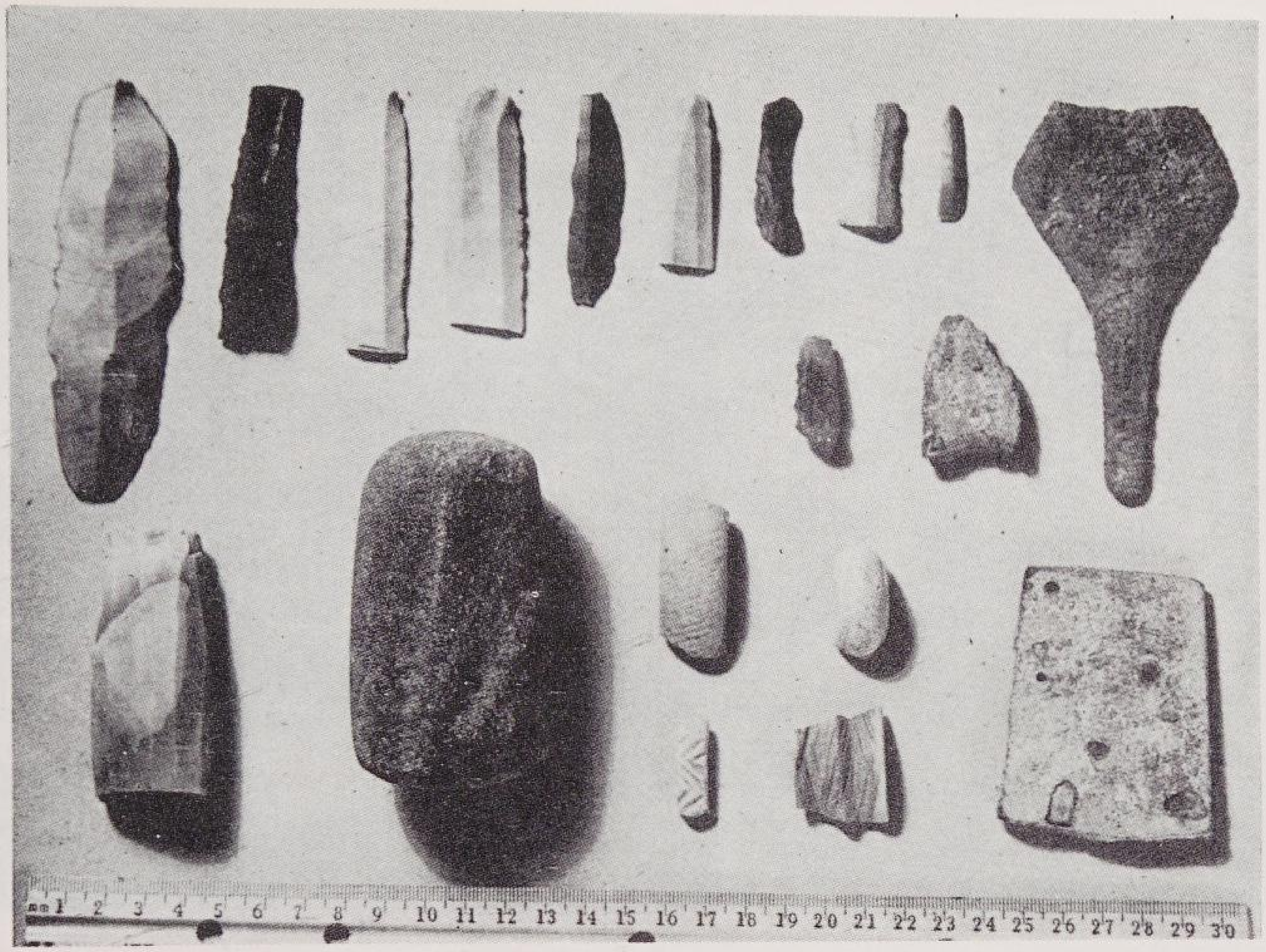




Pl. 7.5. Miscellaneous pottery from Early Harappan sites including mud applique surface treatment in the Hakra Wares style.

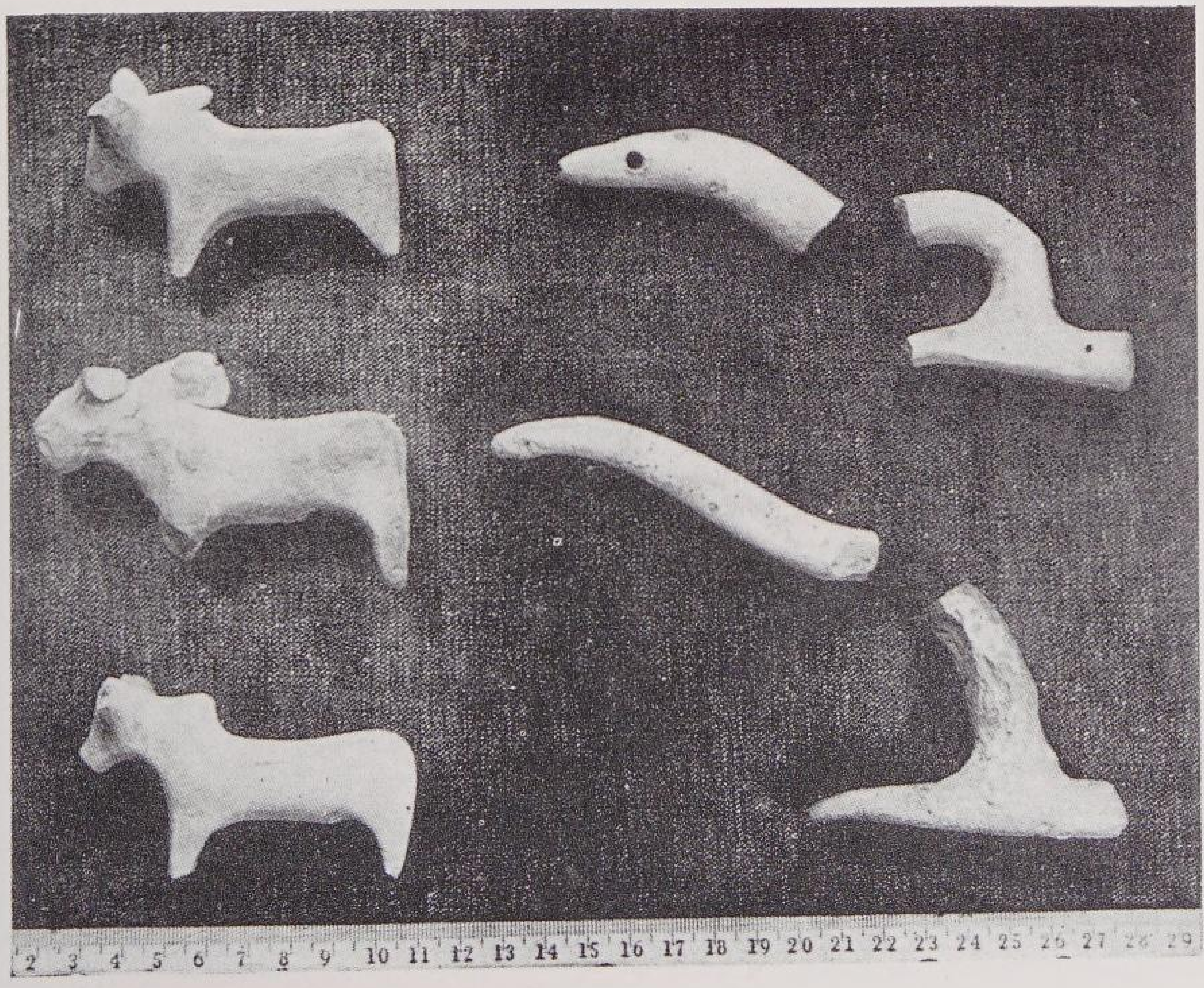
Pl. 7.6. Painted pottery from Mature Harappan sites.

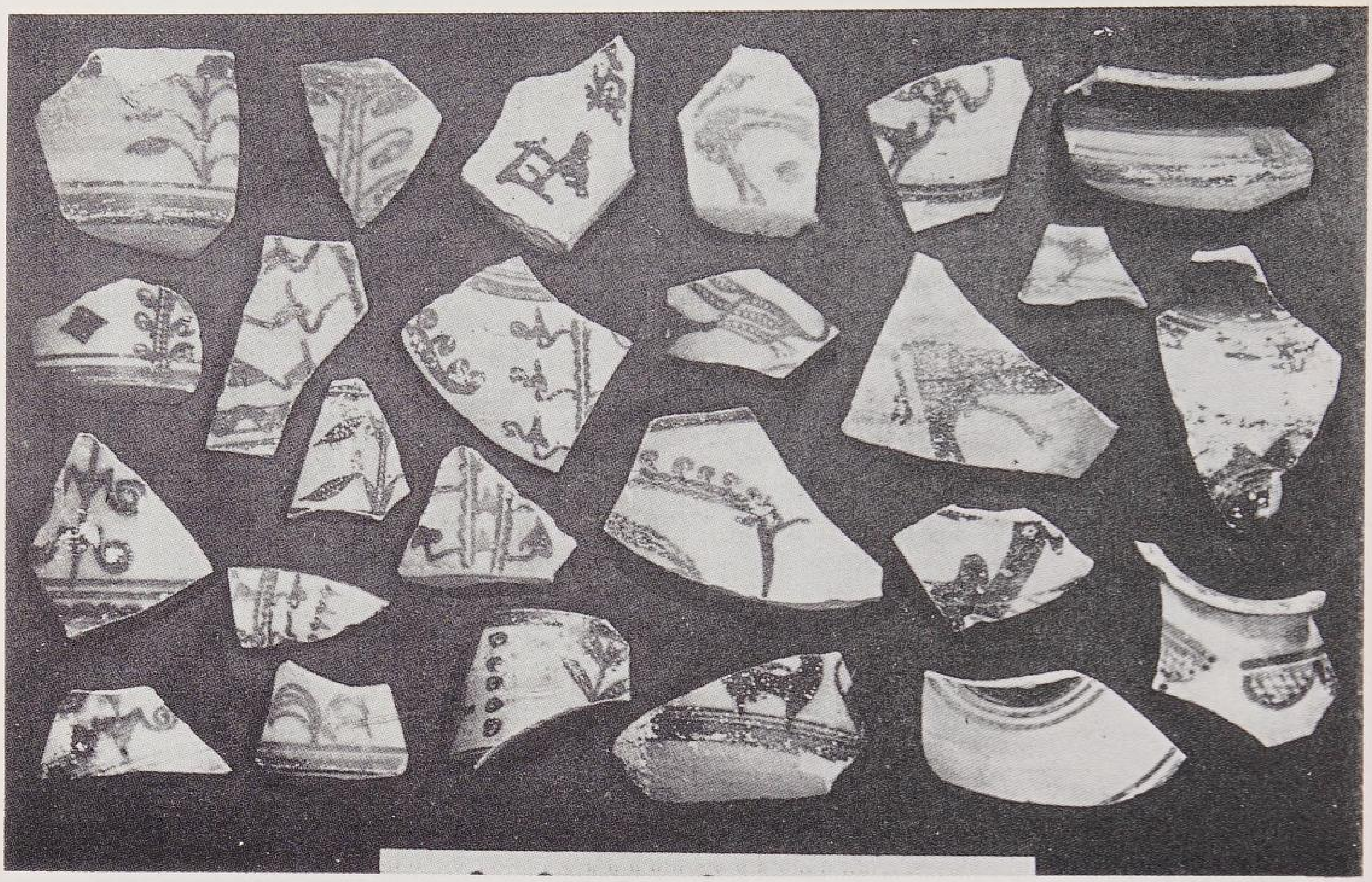




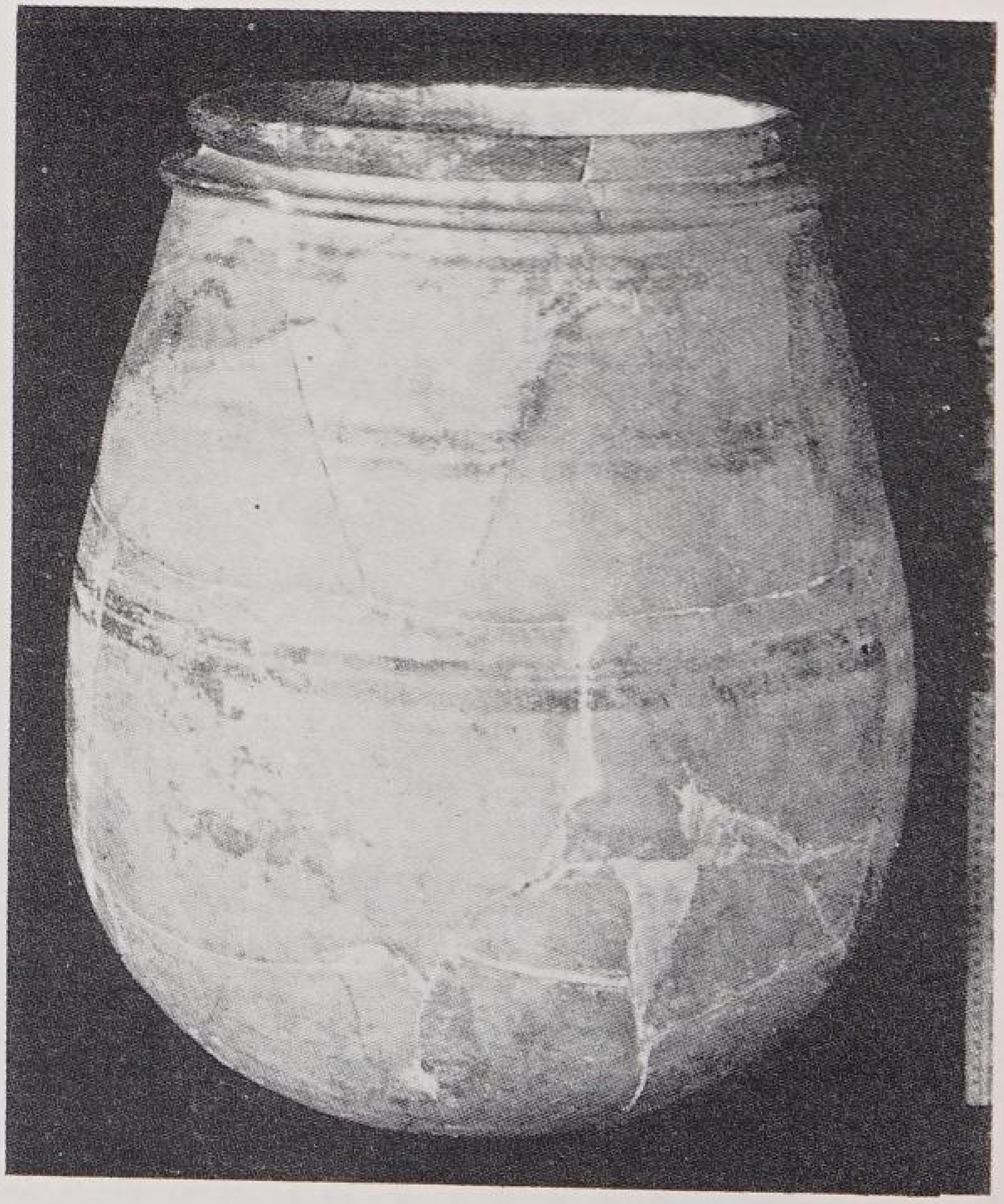
P1. 7.7. Stone, copper and faience objects from Mature Harappan sites.

P1. 7.8. Terracotta humped bull figurines and models of the plough — direct evidence for agriculture — from Mature Harappan sites.

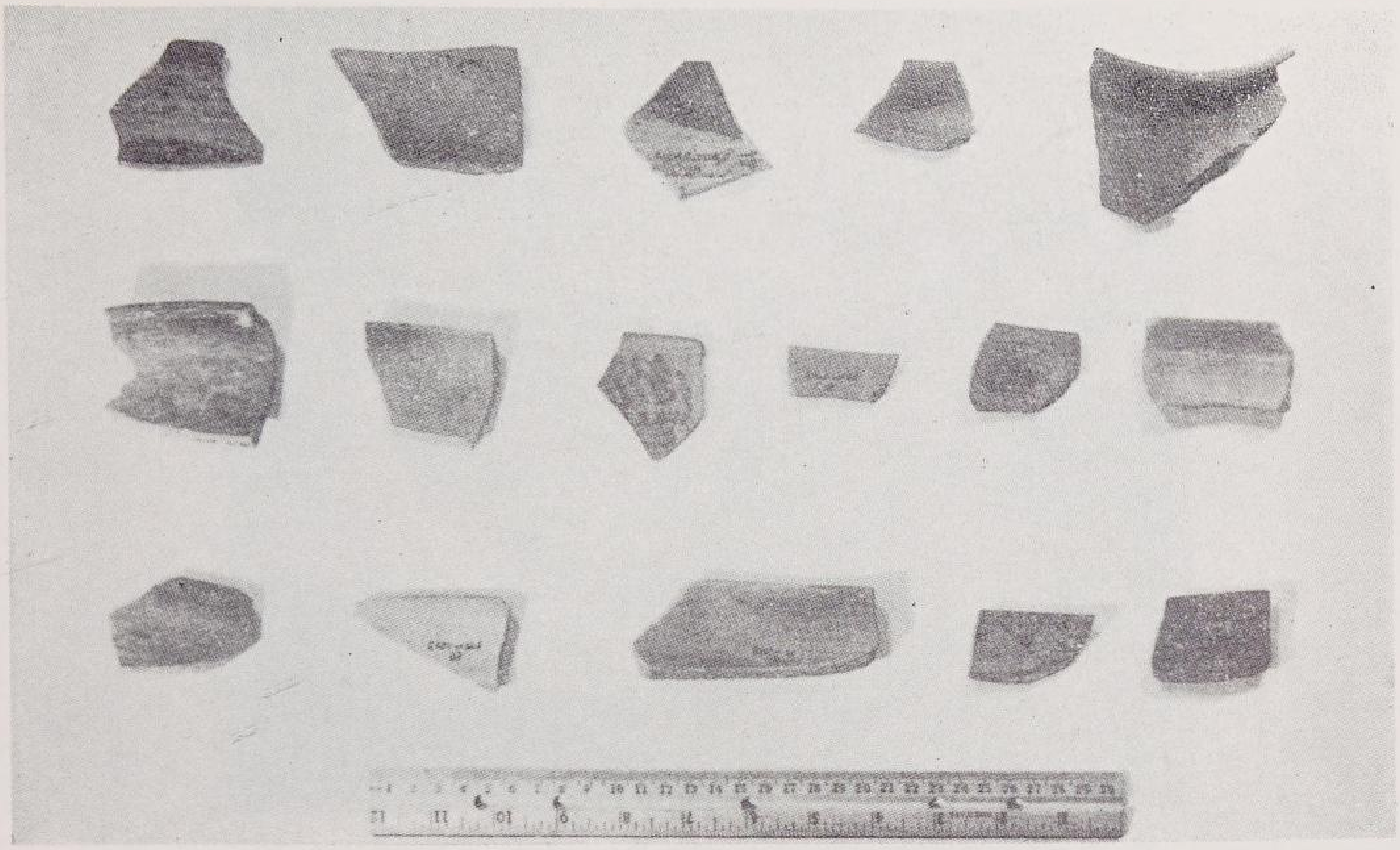




Pl. 7.9. Painted pottery of the Late Harappan Period (Cemetery H related).

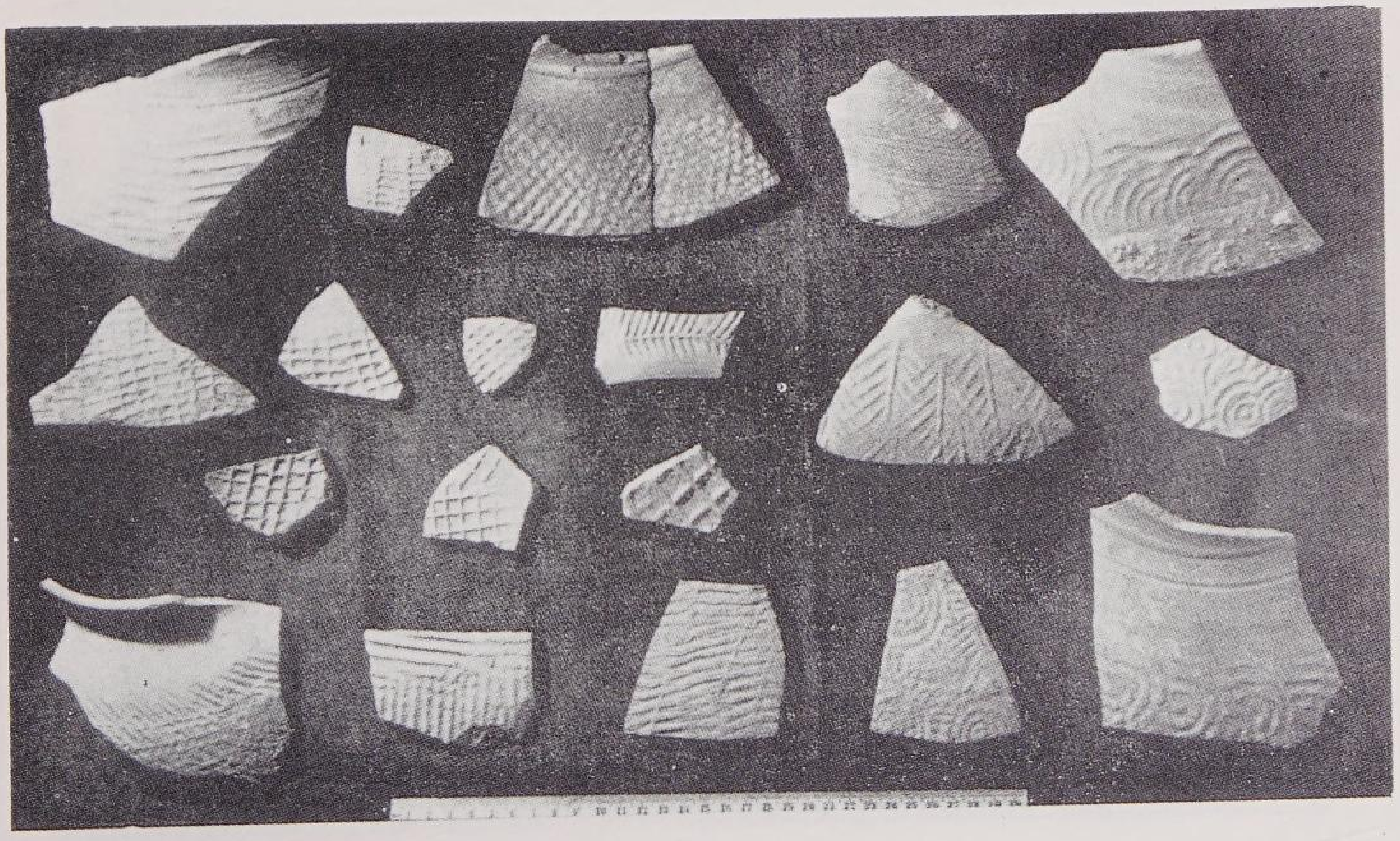


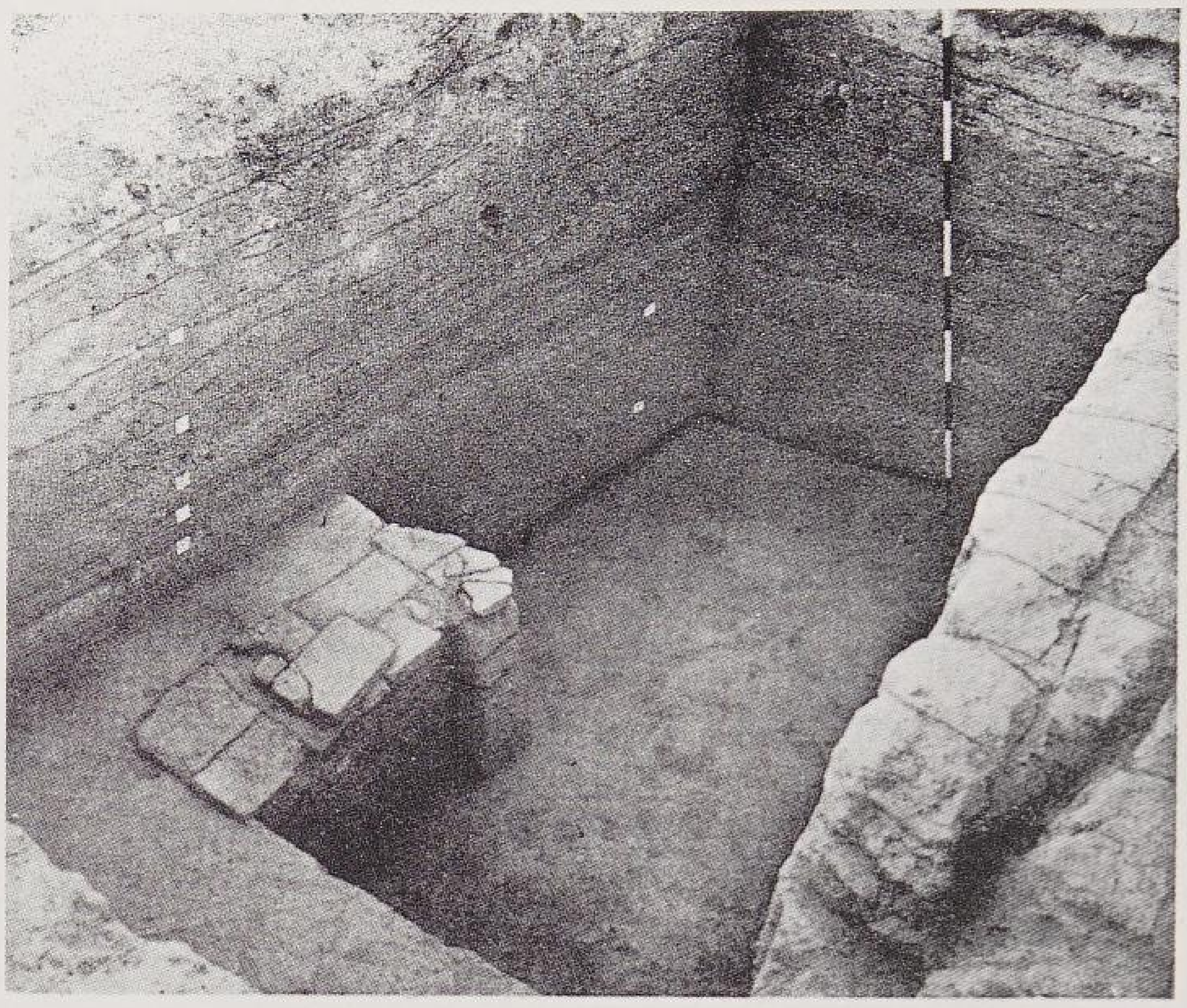
Pl. 7.10. Burial pot from Kudwala, a Late Harappan site.



P1. 7.11. Painted gray and plain gray pottery from PGW sites.

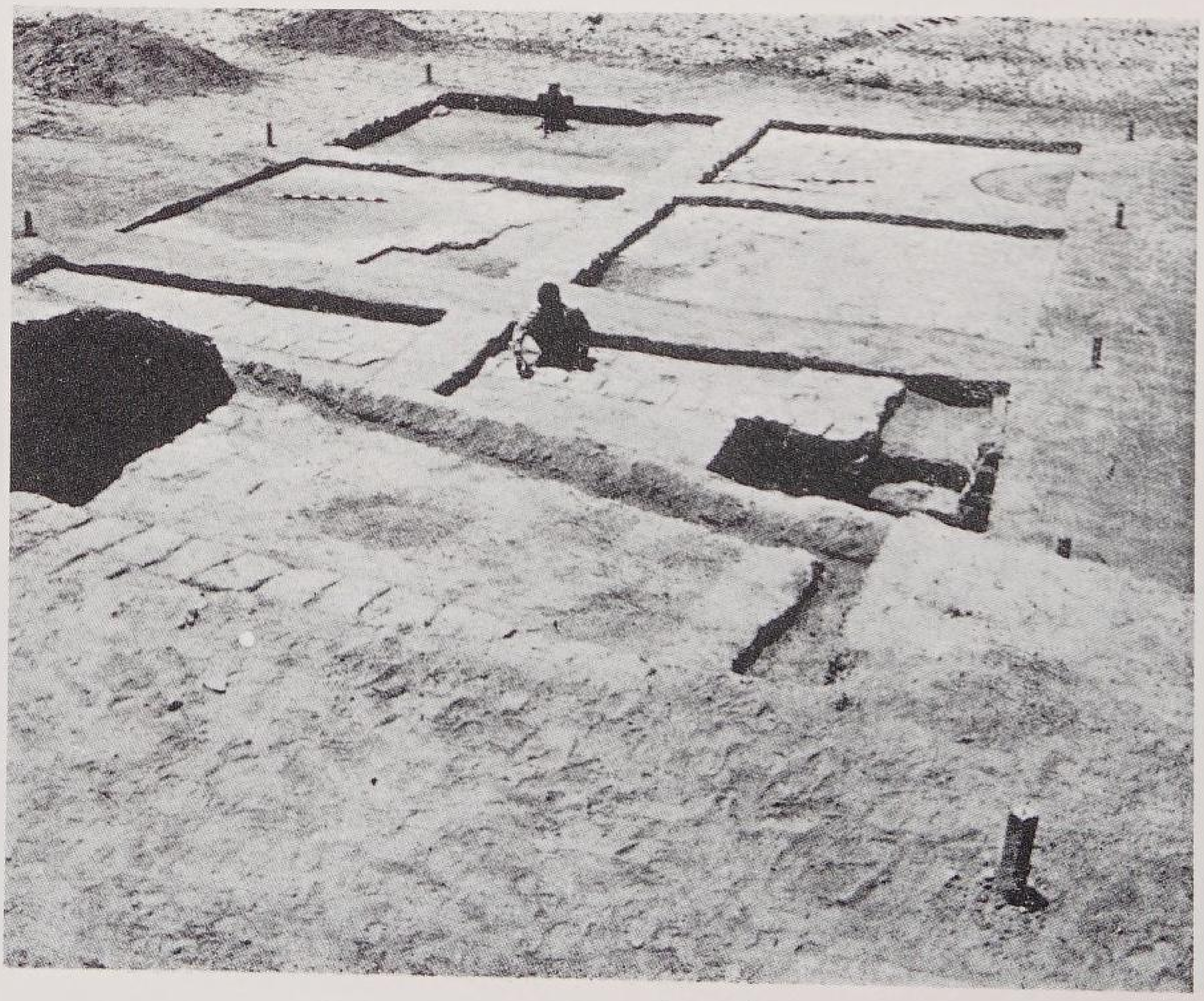
P1. 7.12. Red pottery with impressed designs from PGW sites.

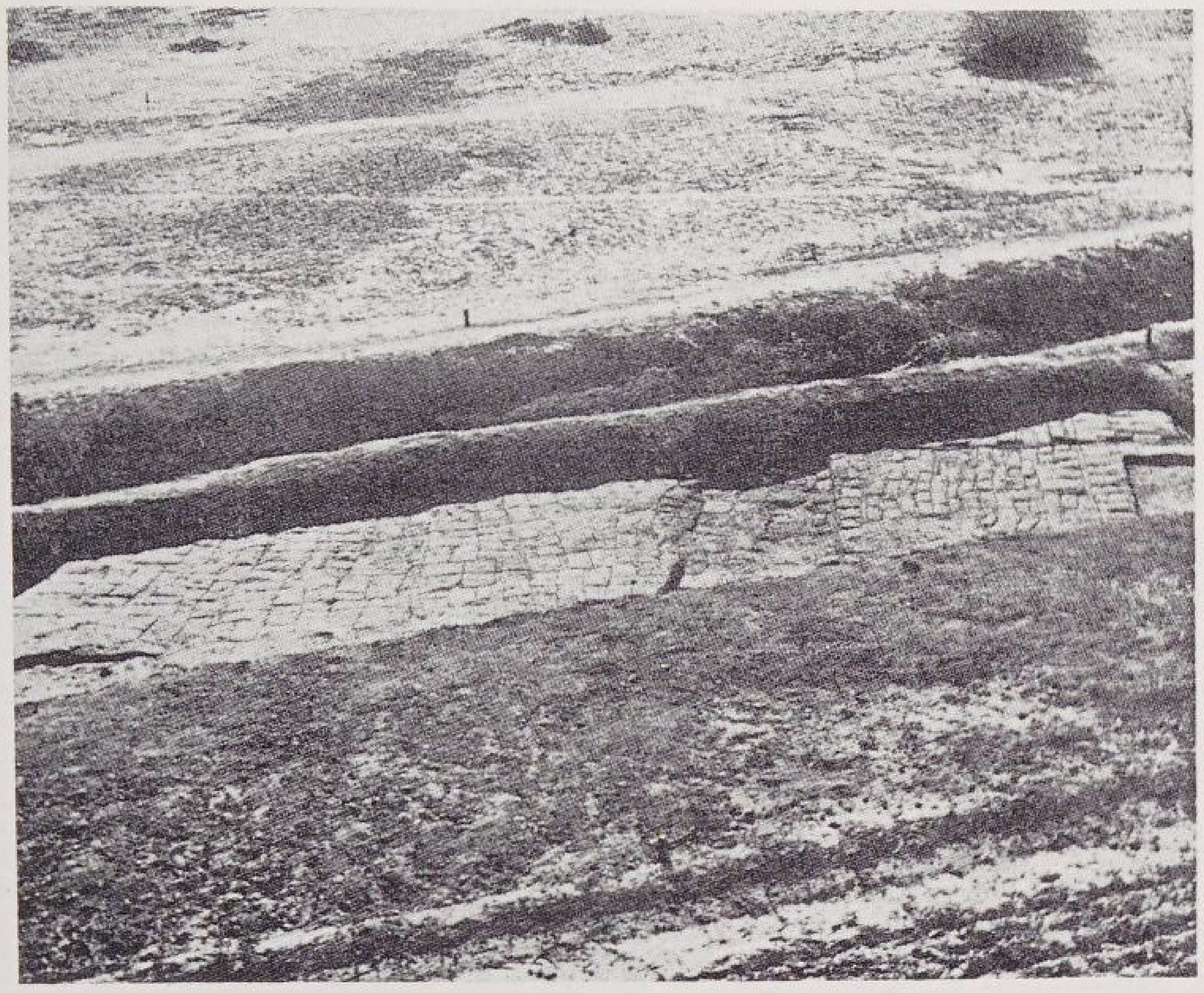




Pl. 10.1. The baked brick structure of Pre-Indus times may be seen below in excavation. Mud bricks are seen above on the right.

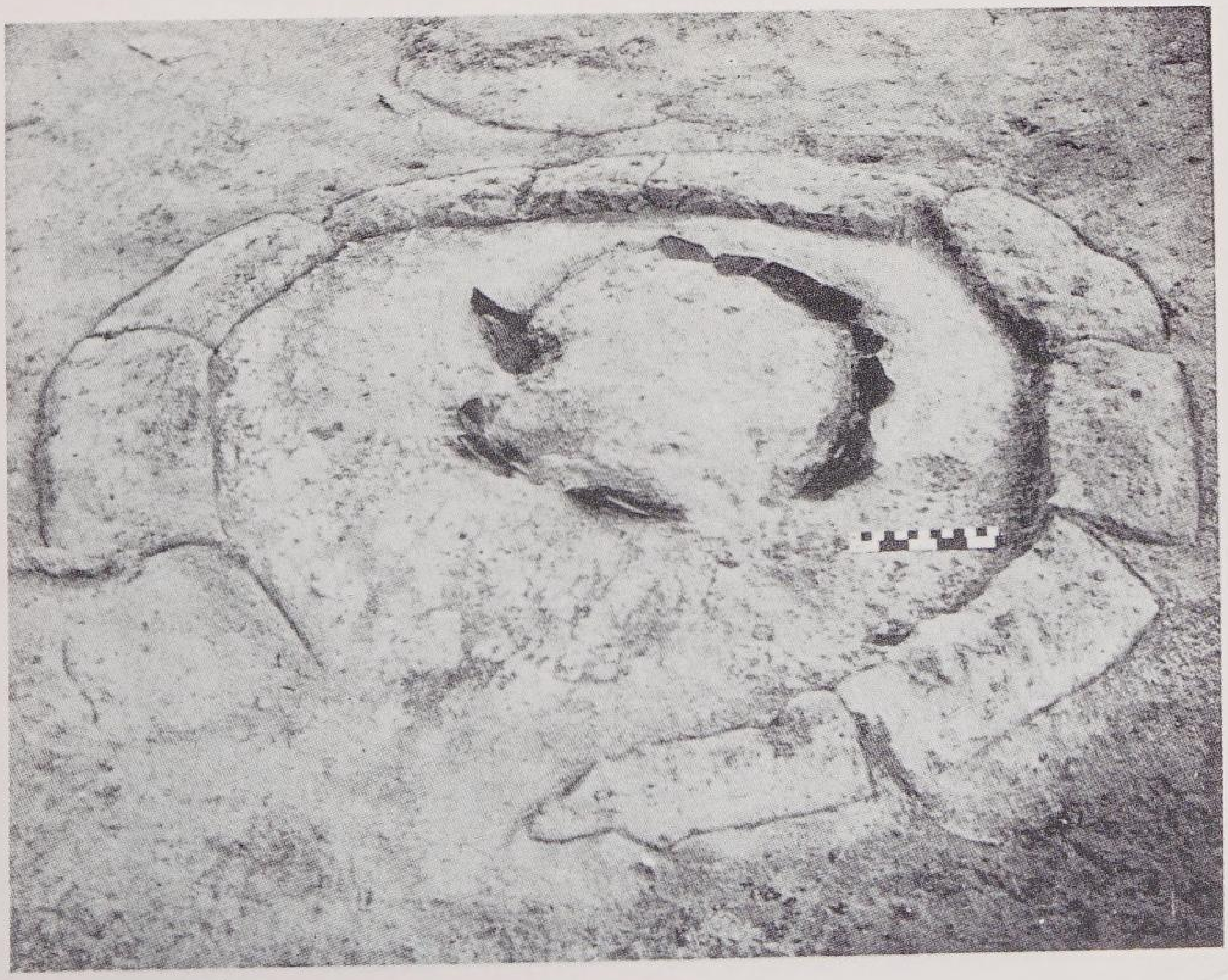
Pl. 10.2. Pre-Indus structures made of bricks of regular size.

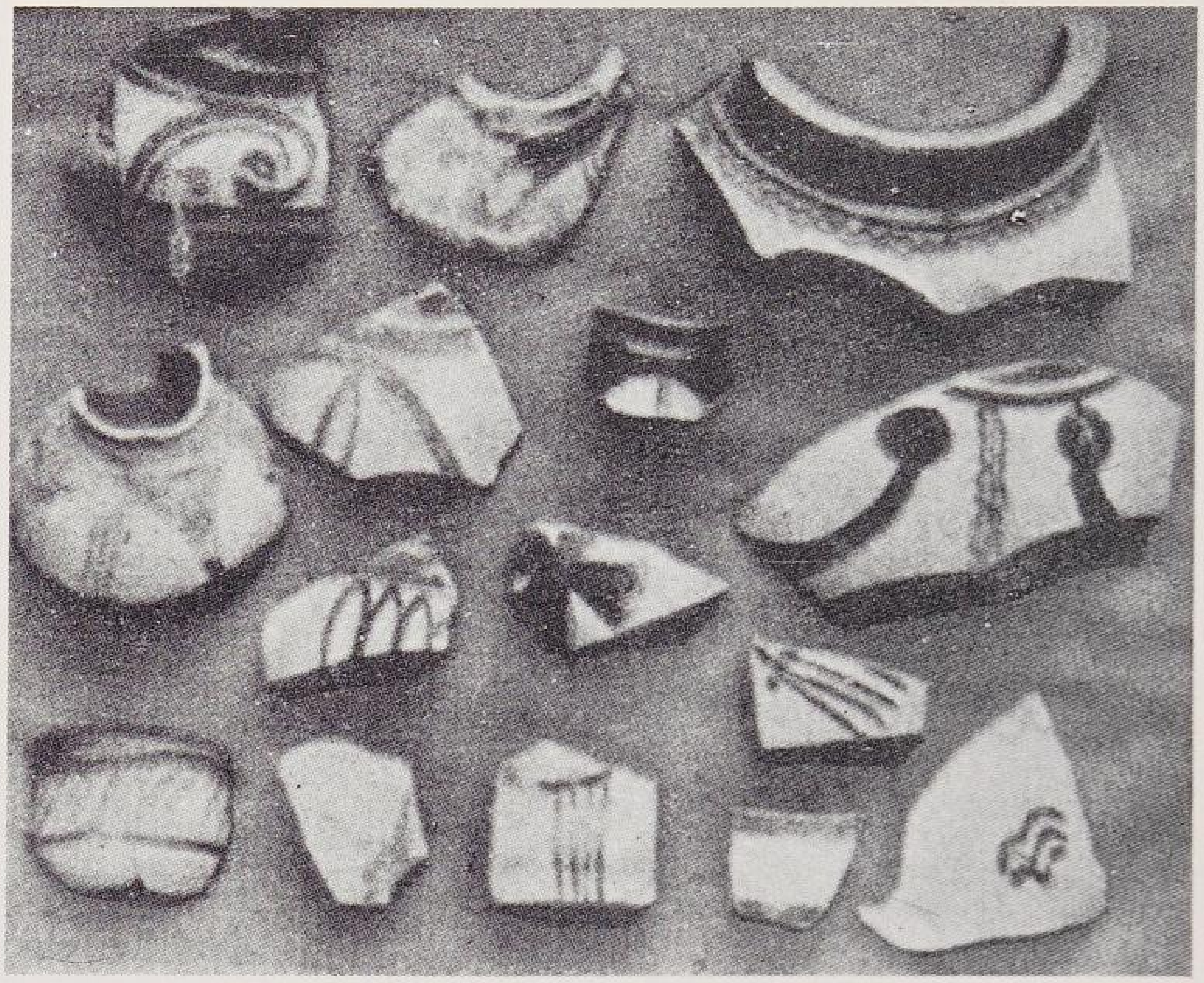




Pl. 10.3. Pre-Indus brick-on-edge pathway on the right running along the Indus defensive wall of the citadel, on the left.

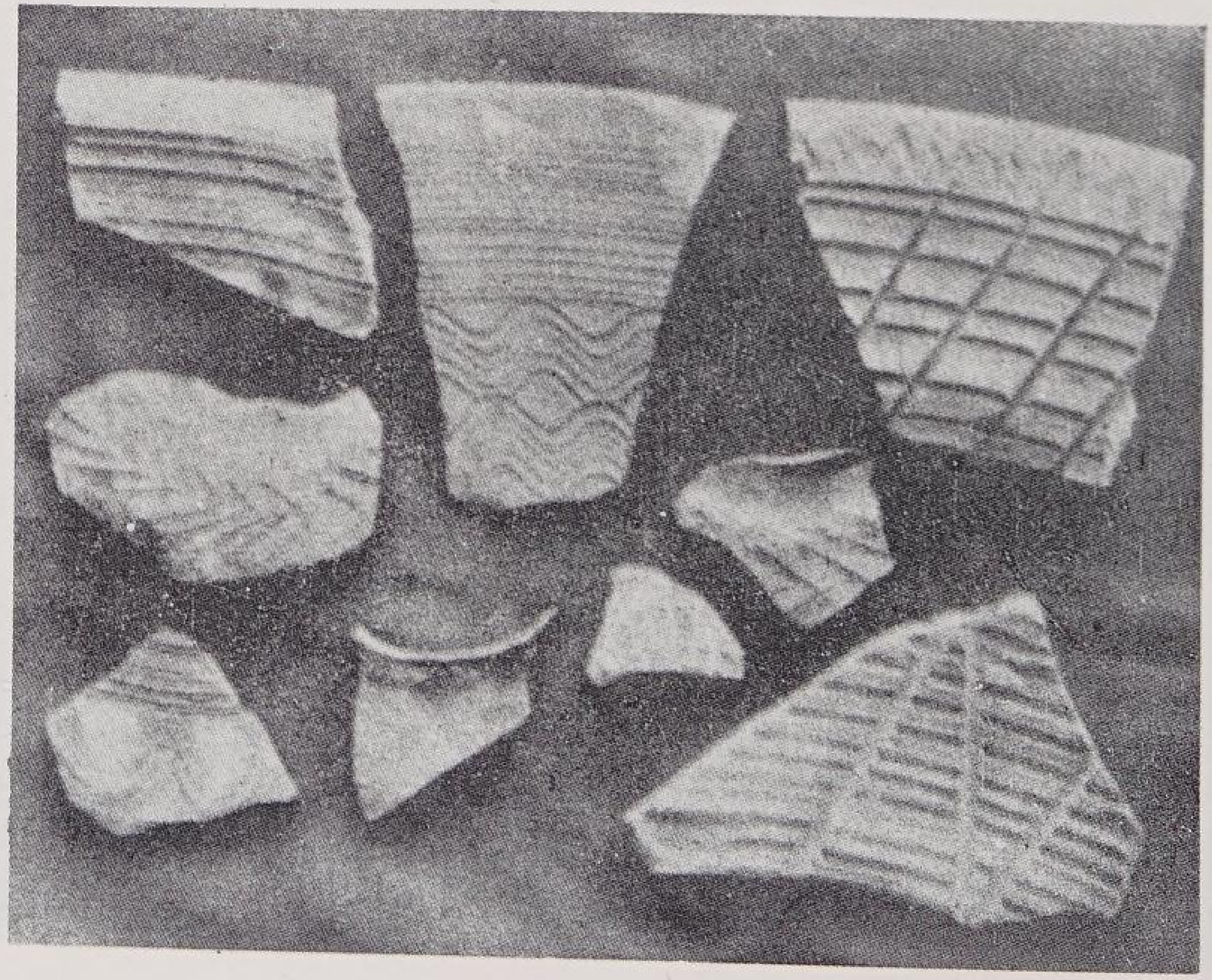
Pl. 10.4. A Pre-Indus fireplace lined with mud bricks.

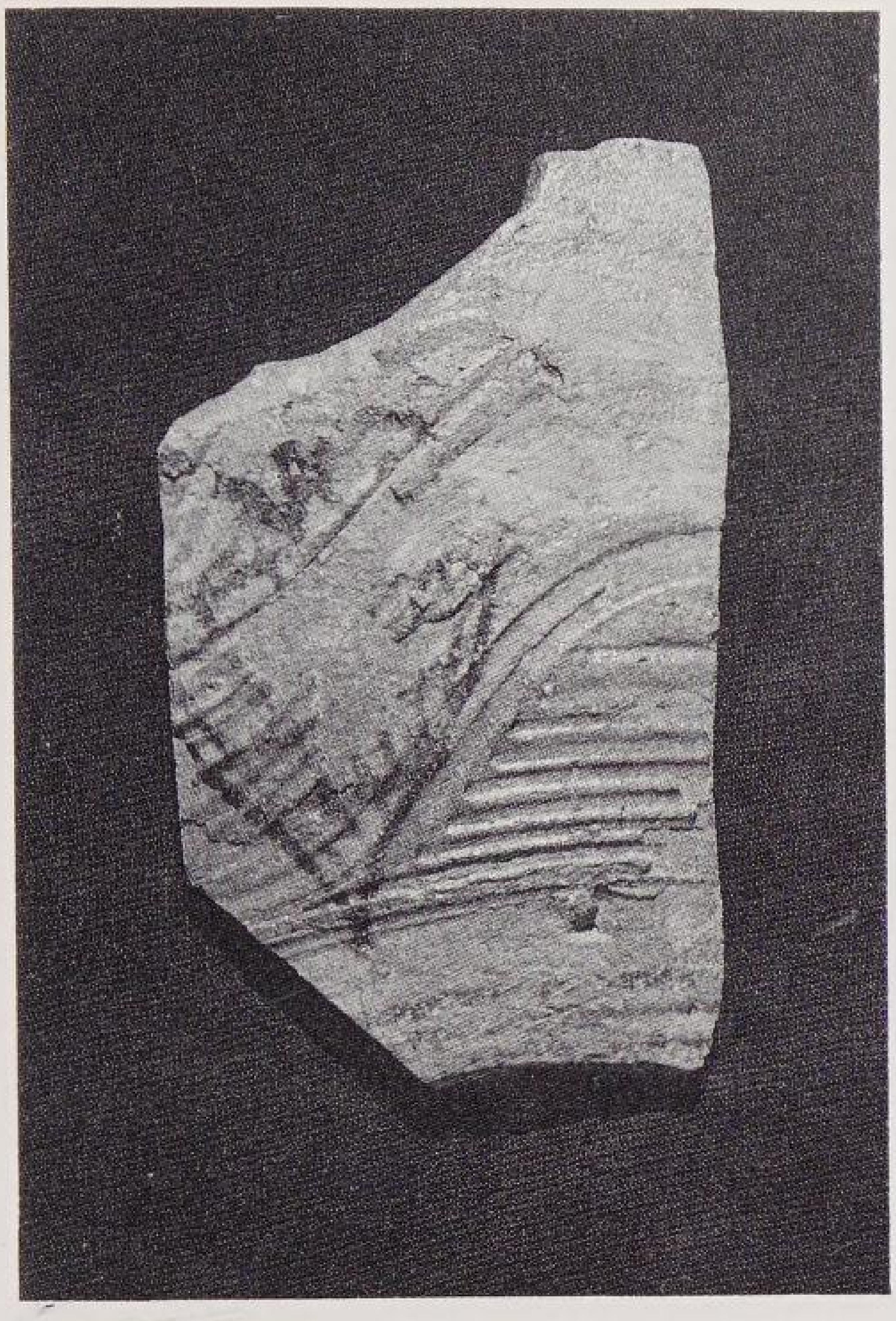




Pl. 10.5. Pre-Indus pottery.

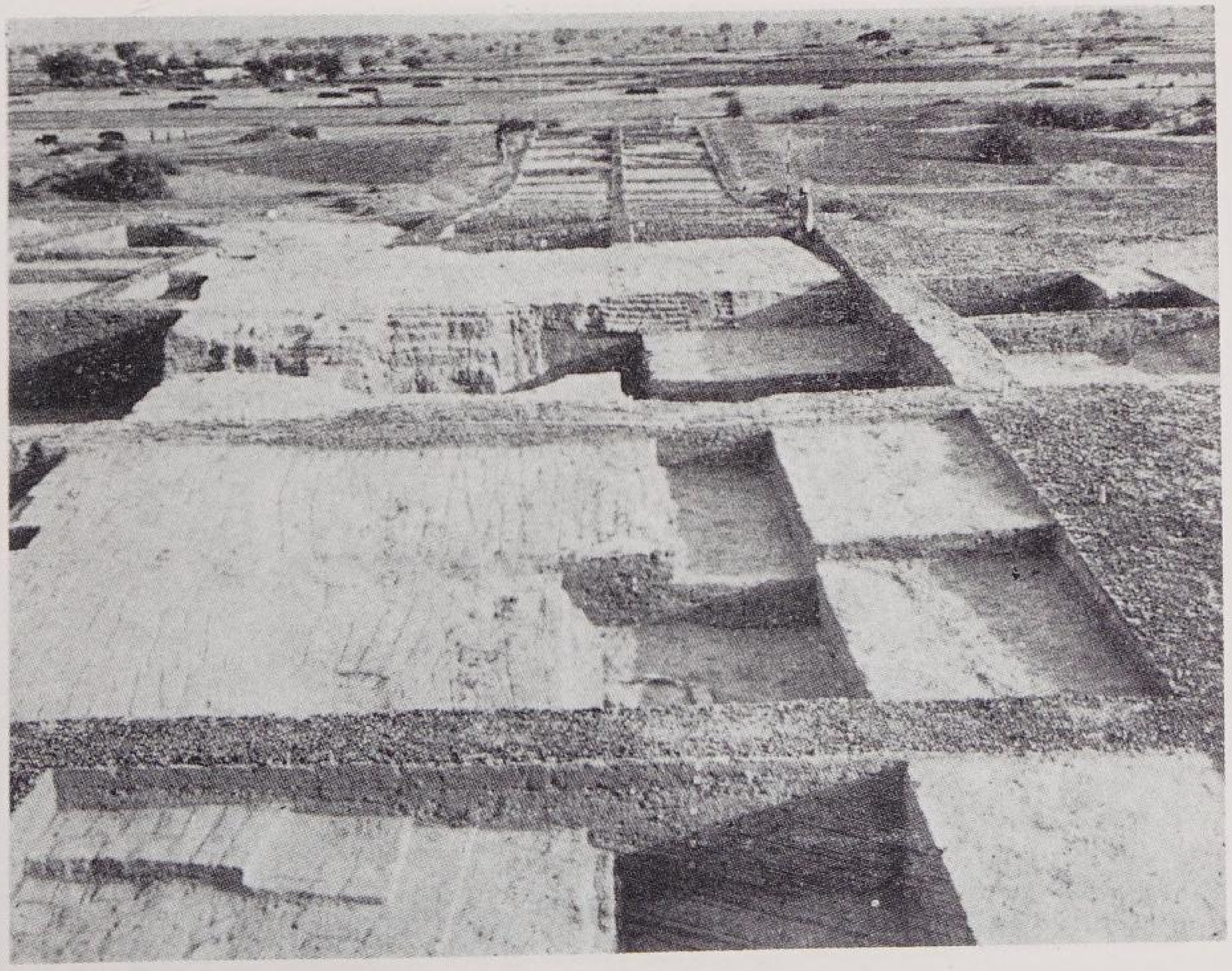
Pl. 10.6. Pre-Indus incised pottery.

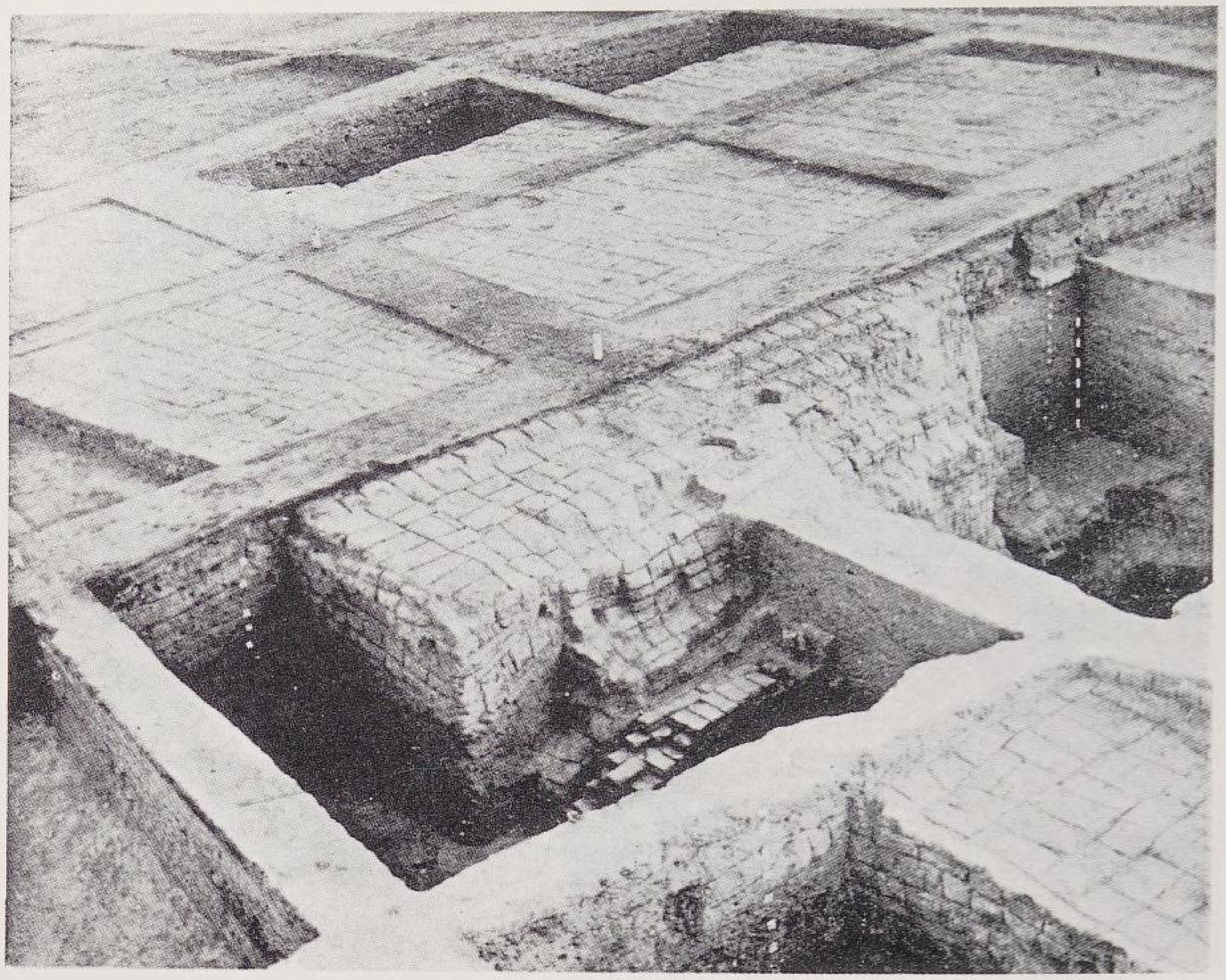




Pl. 10.7. Canopied *ratha* painted on a sherd with a Pre-Indus fabric.

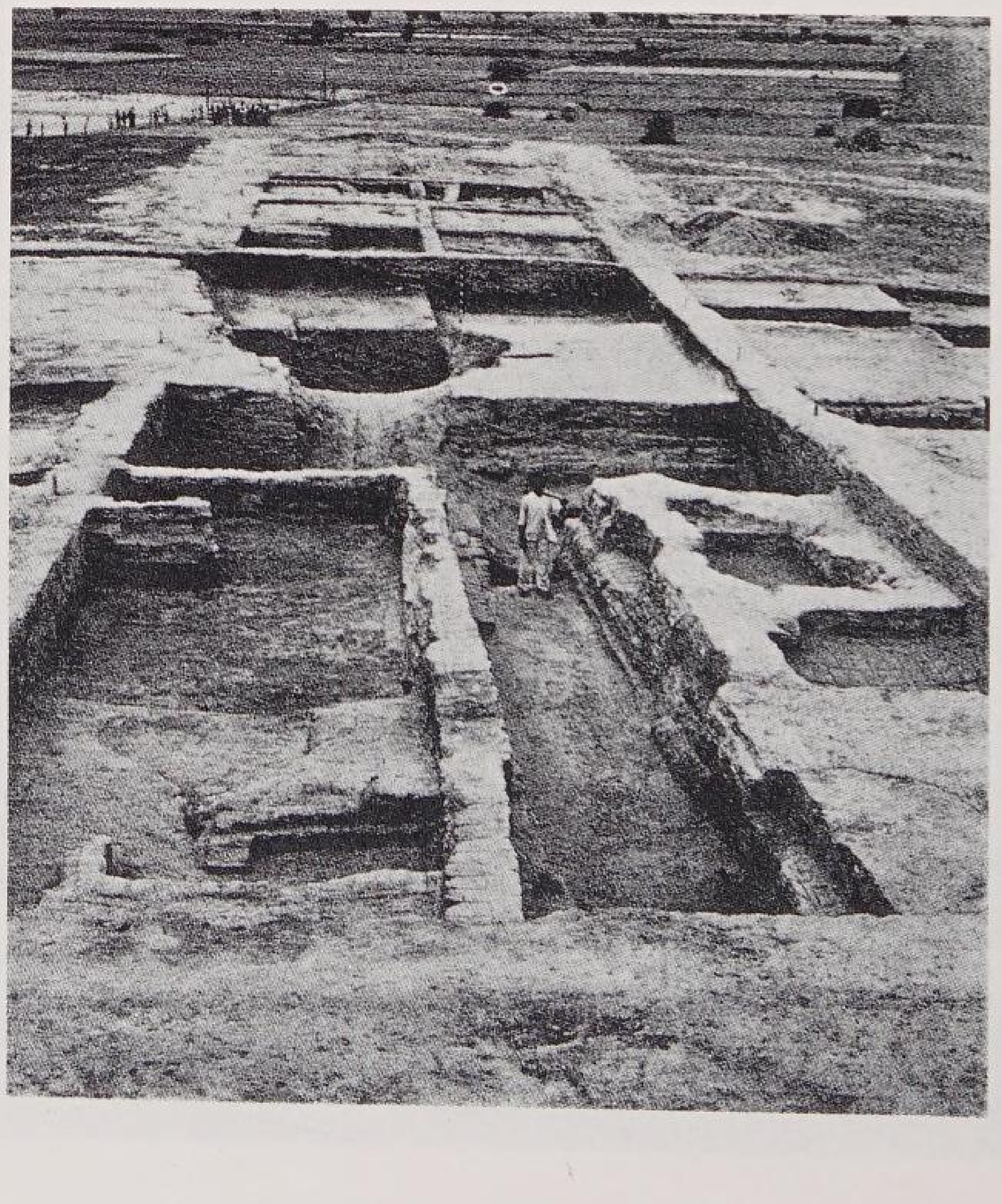
Pl. 10.8. The defense wall of the Indus acropolis. The narrow postern entrance, and the bastion projecting toward the "lower town".

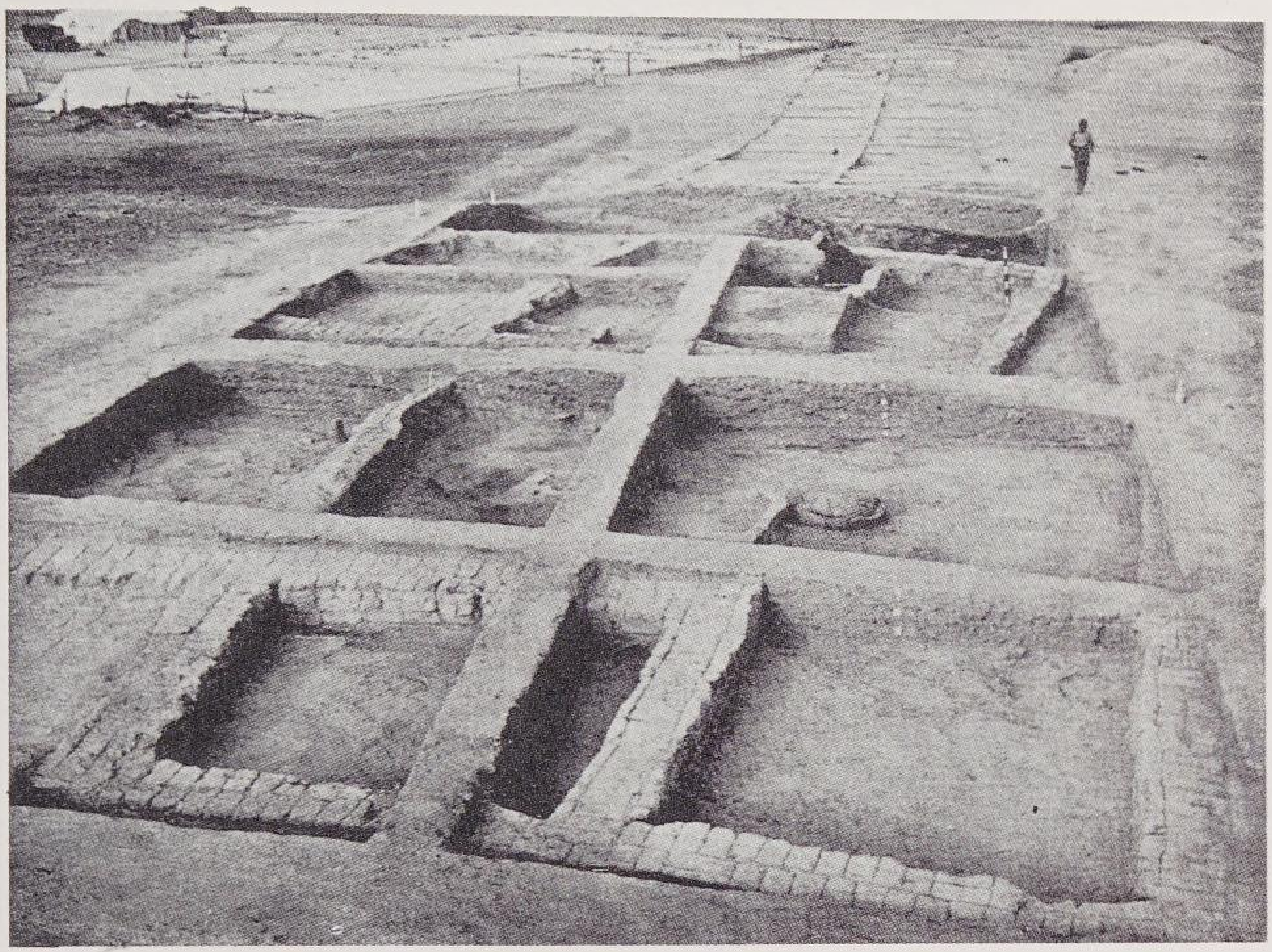




Pl. 10.9. The bastion and the narrow passage with a built-in *pucca* drain beside it. The defense wall surrounds the Indus acropolis.

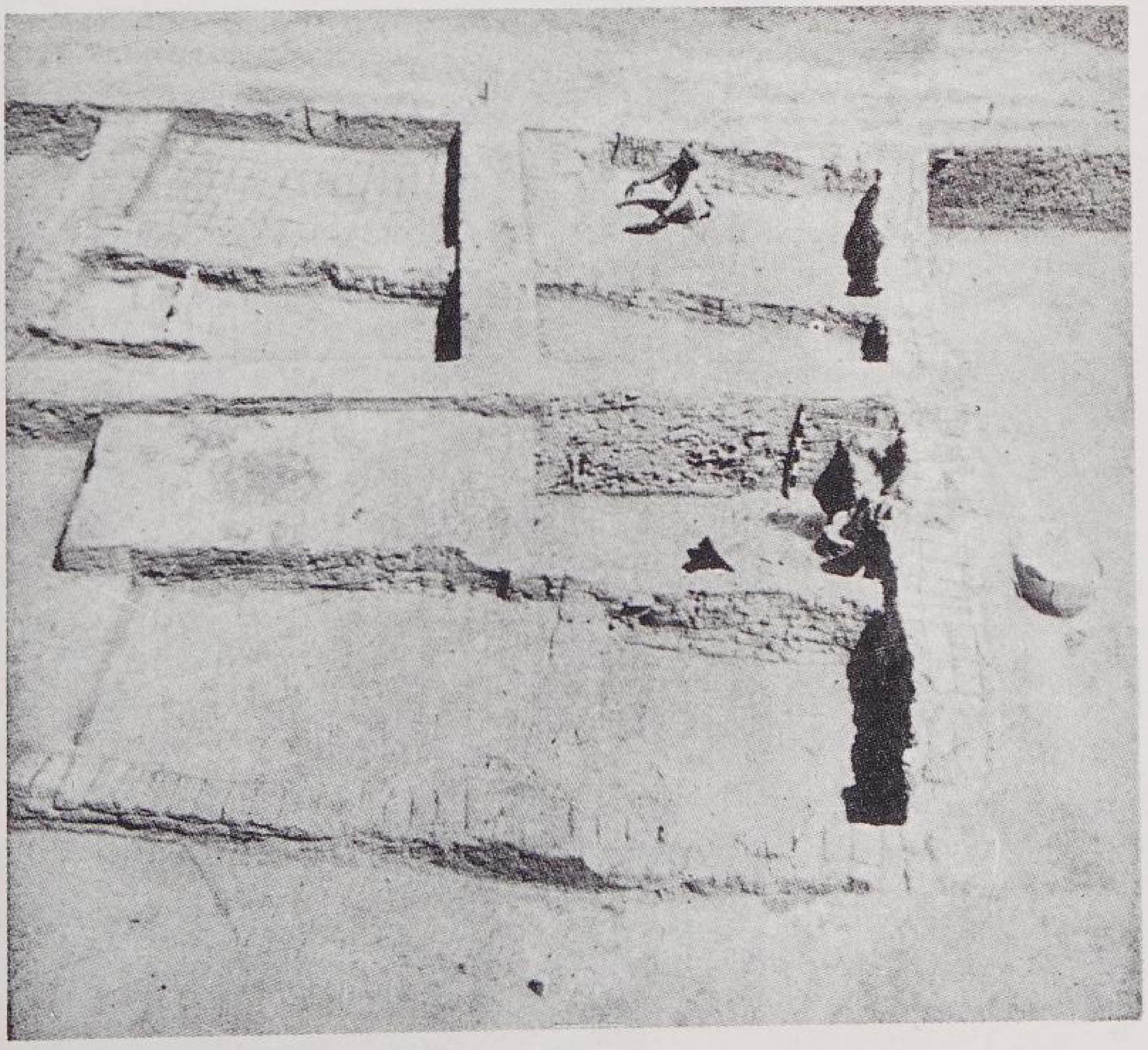
Pl. 10.10. The defense wall separating the acropolis (foreground) from the "down-town" of Indus times. Major roads run along the sides of the wall. A narrow alley is seen in the foreground.

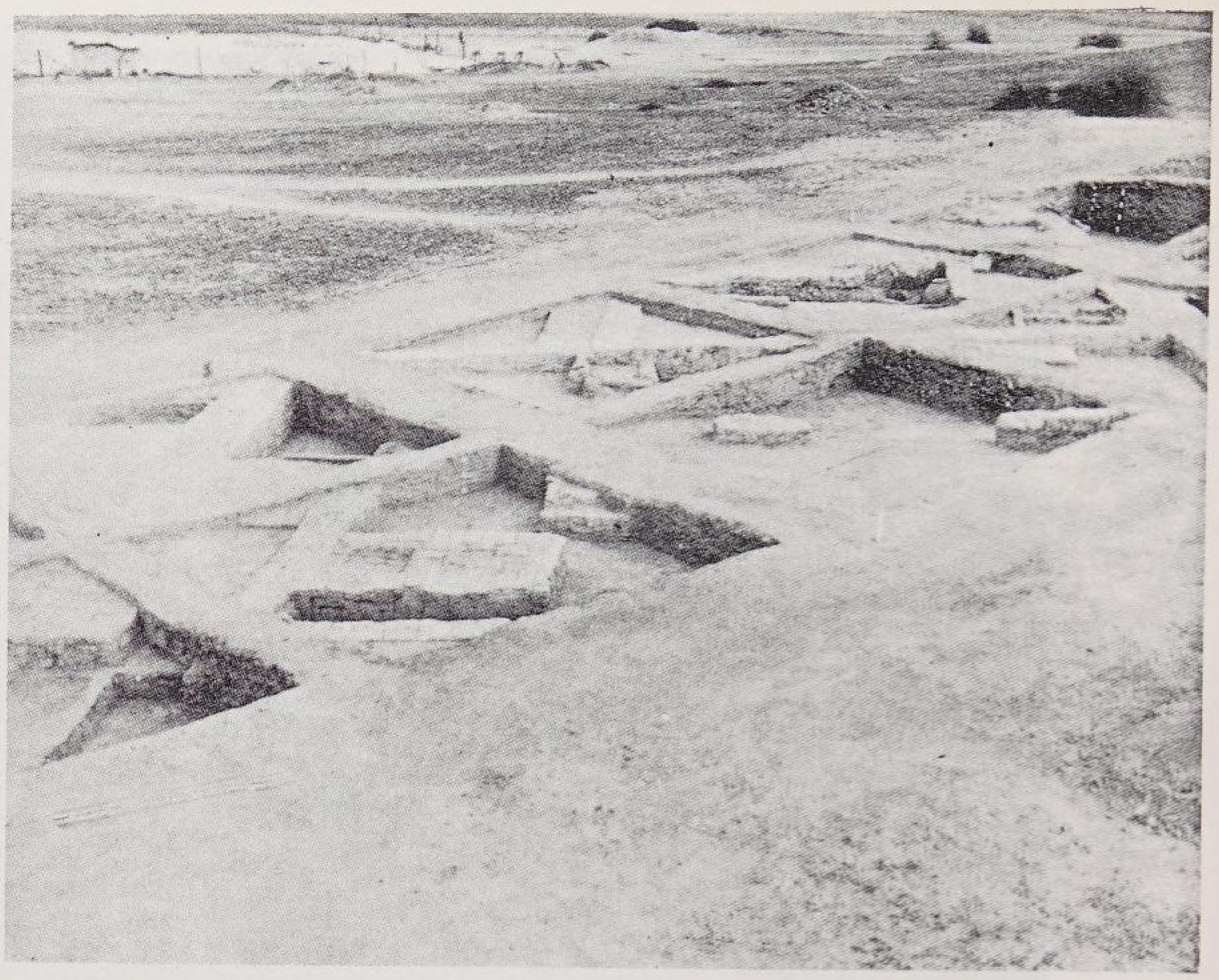




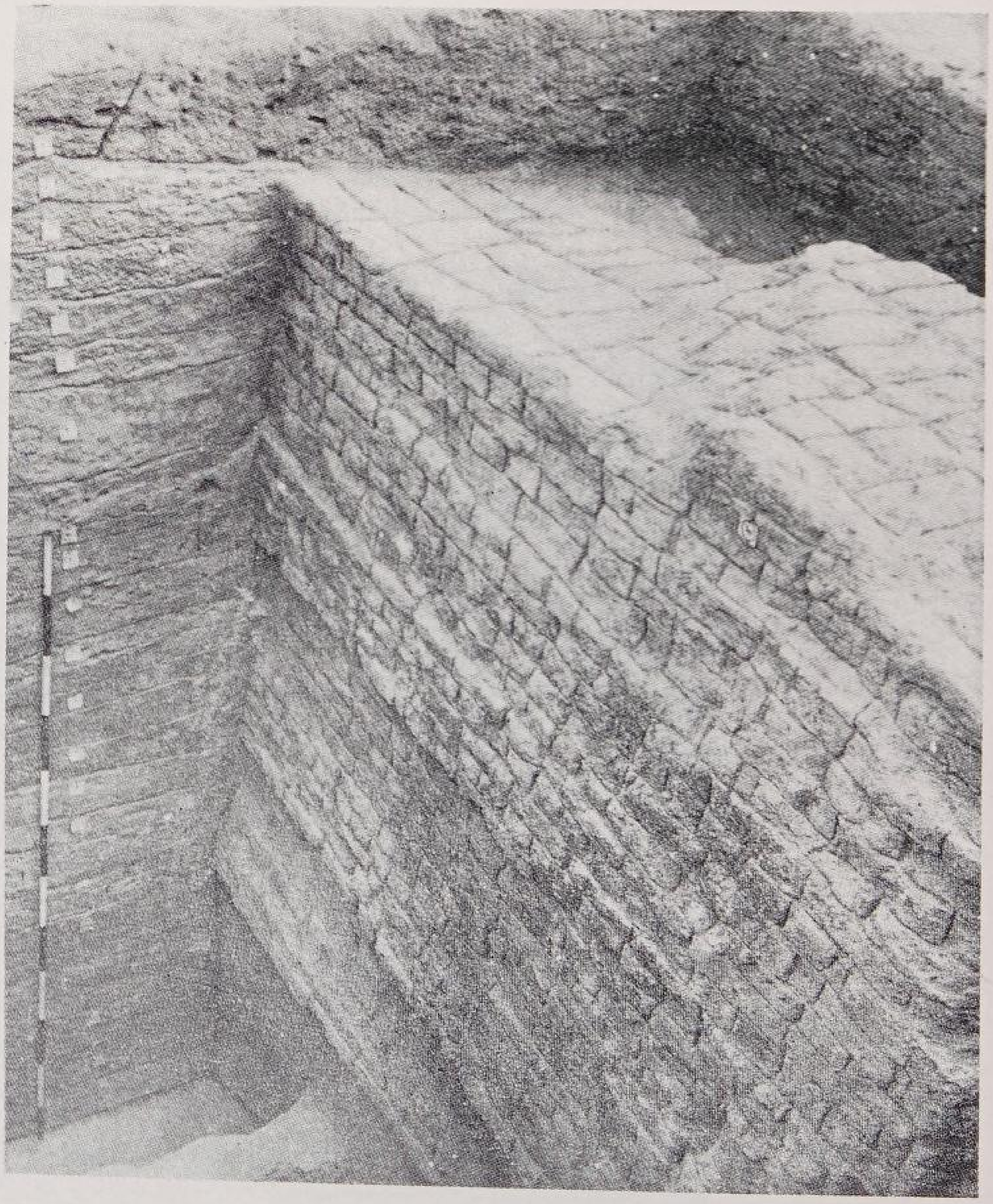
Pl. 10.11a. House of a rich merchant (?).

Pl. 10.11b. Another view of the merchant's (?) house with a paved sitting room and toilet.

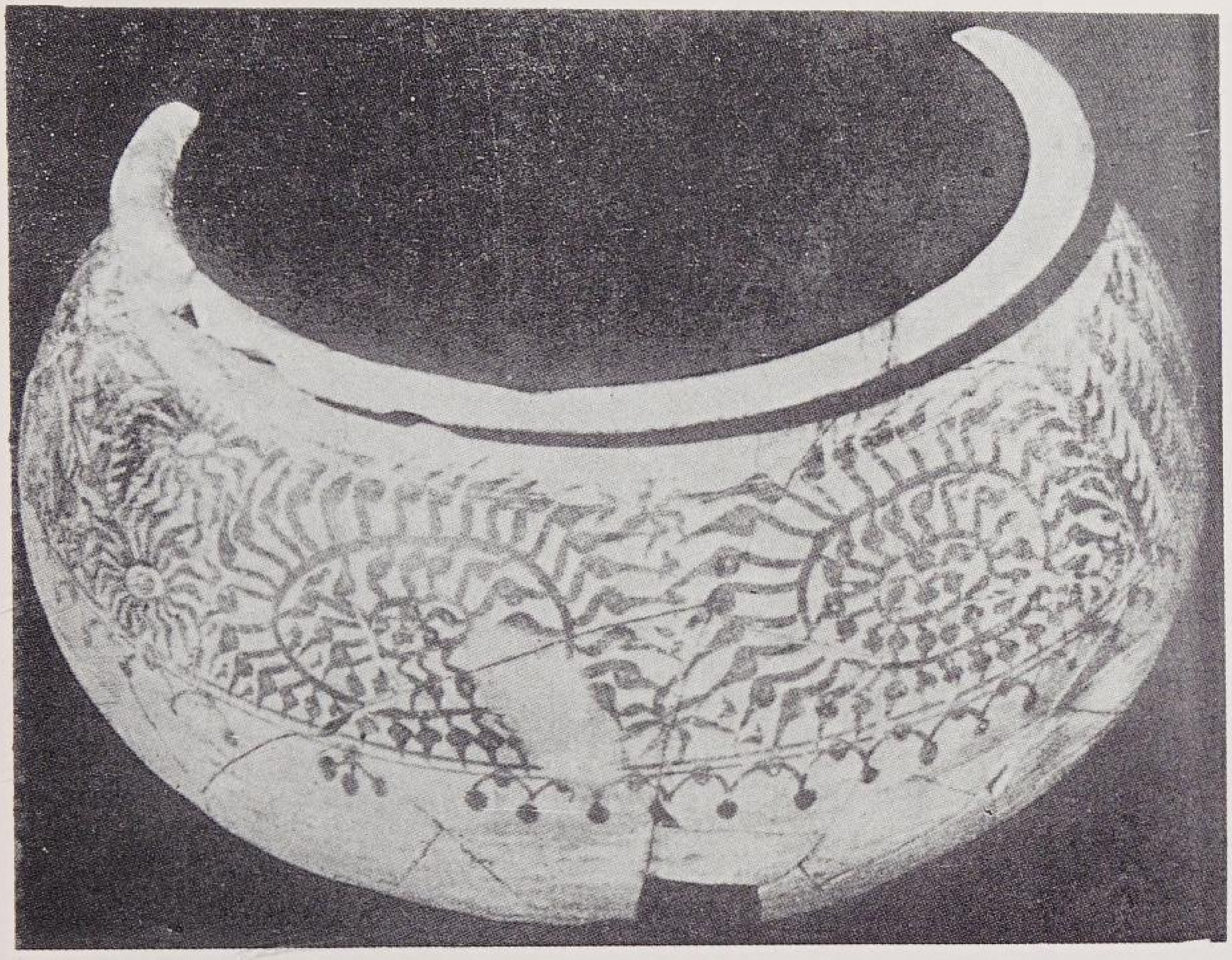




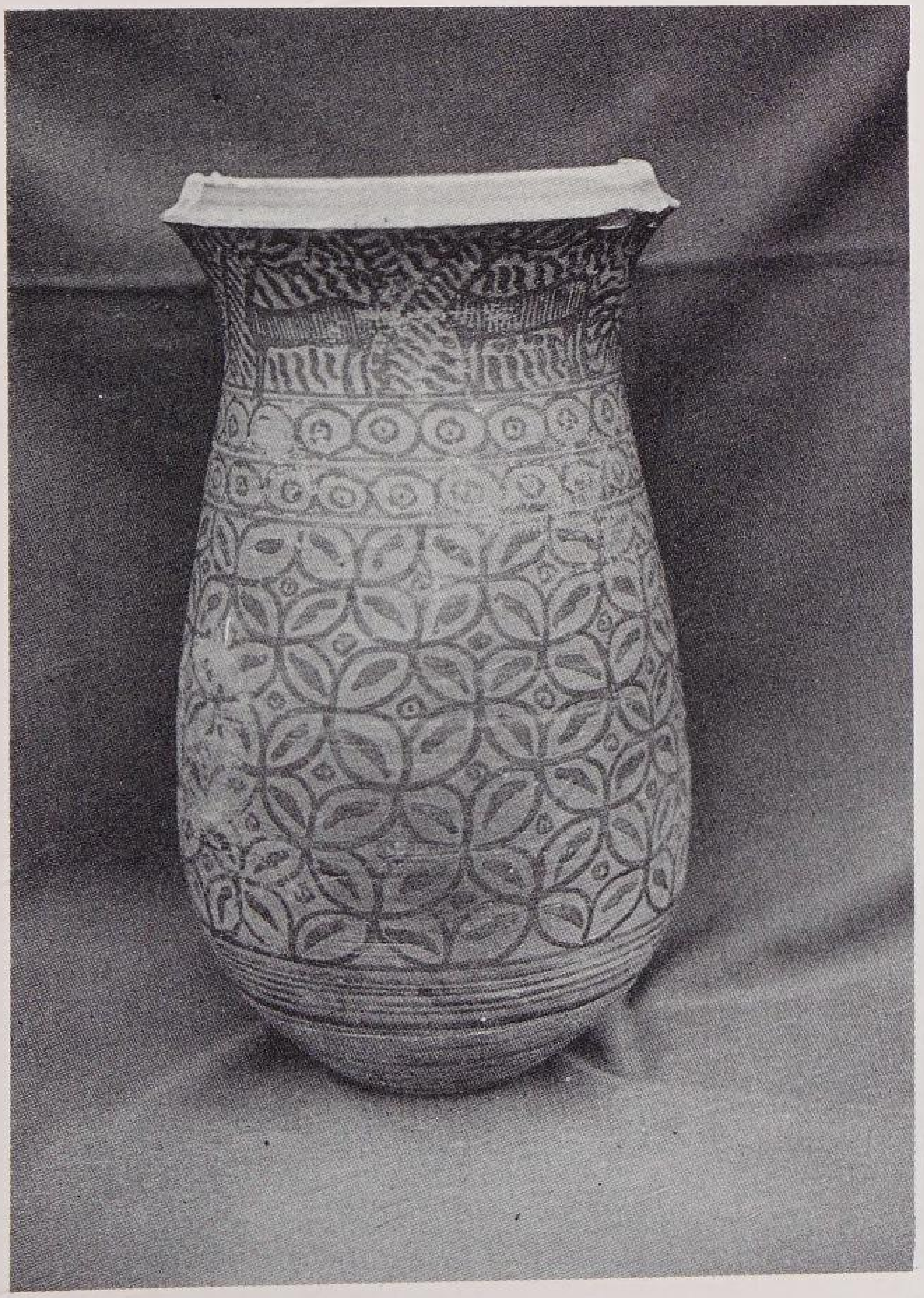
Pl. 10.12. Excavated houses in the lower town.



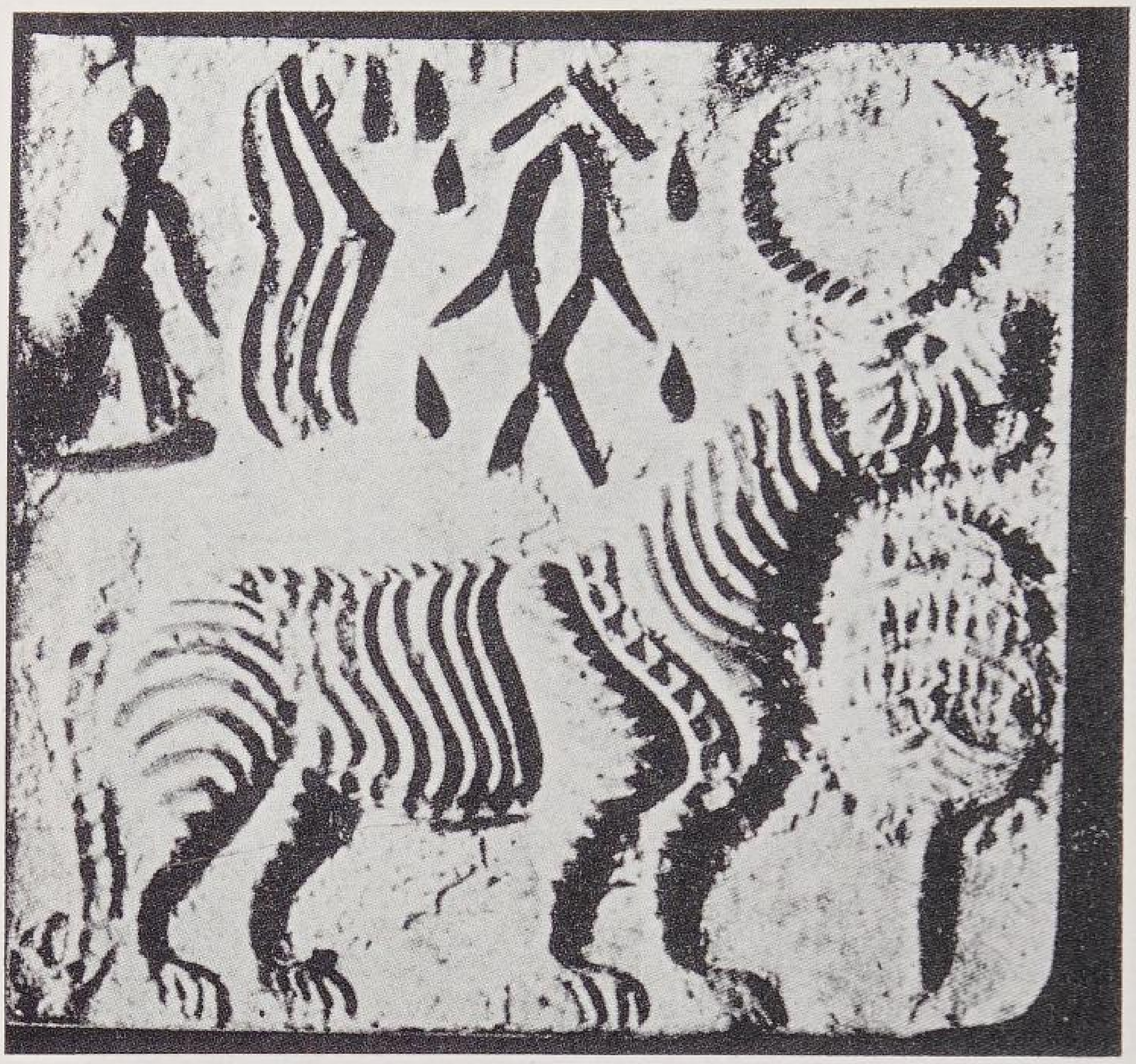
Pl. 10.13. Four successive building phases of a house beside a major road in "the upper town".



Pl. 10.14. Period II pottery.

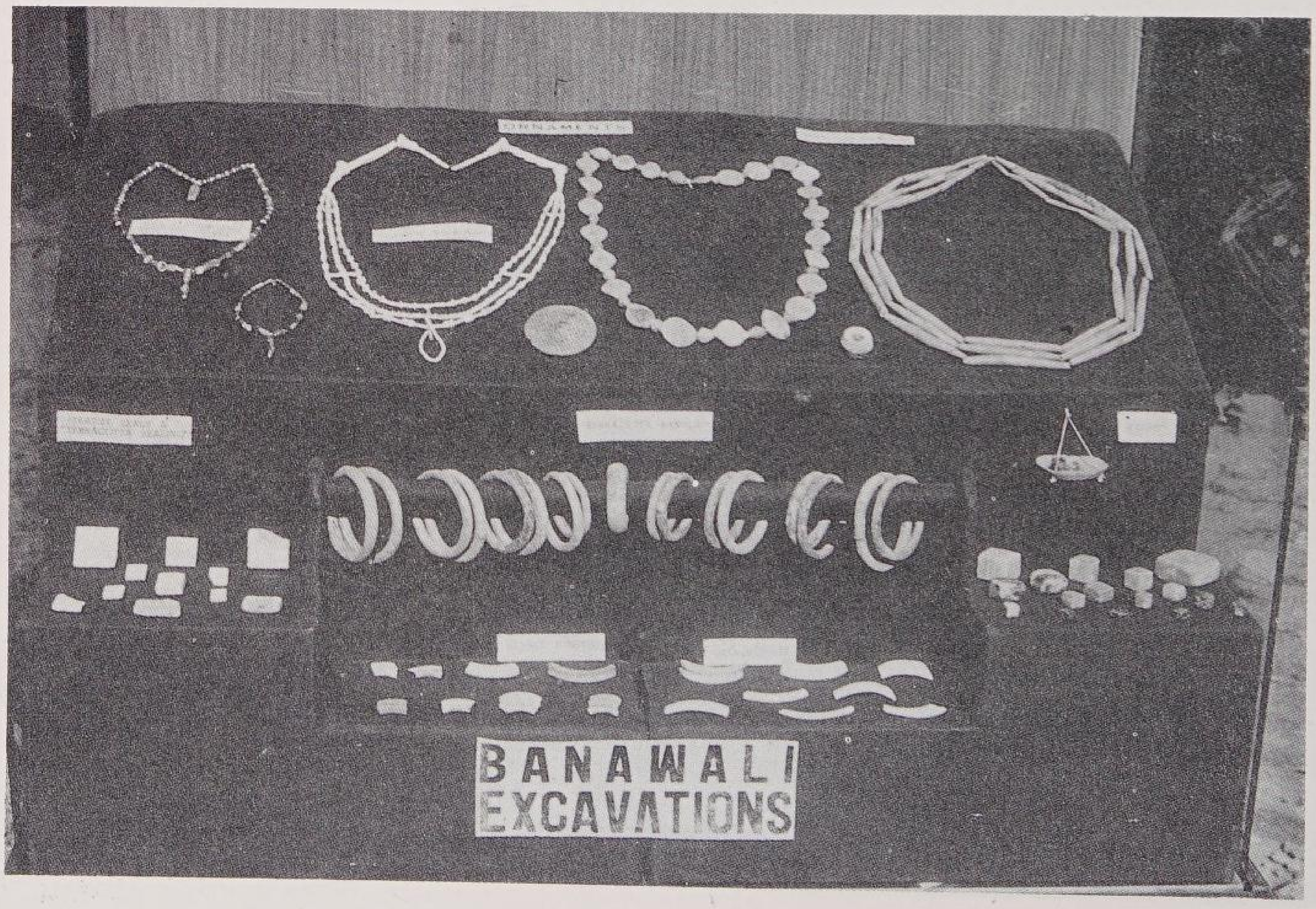


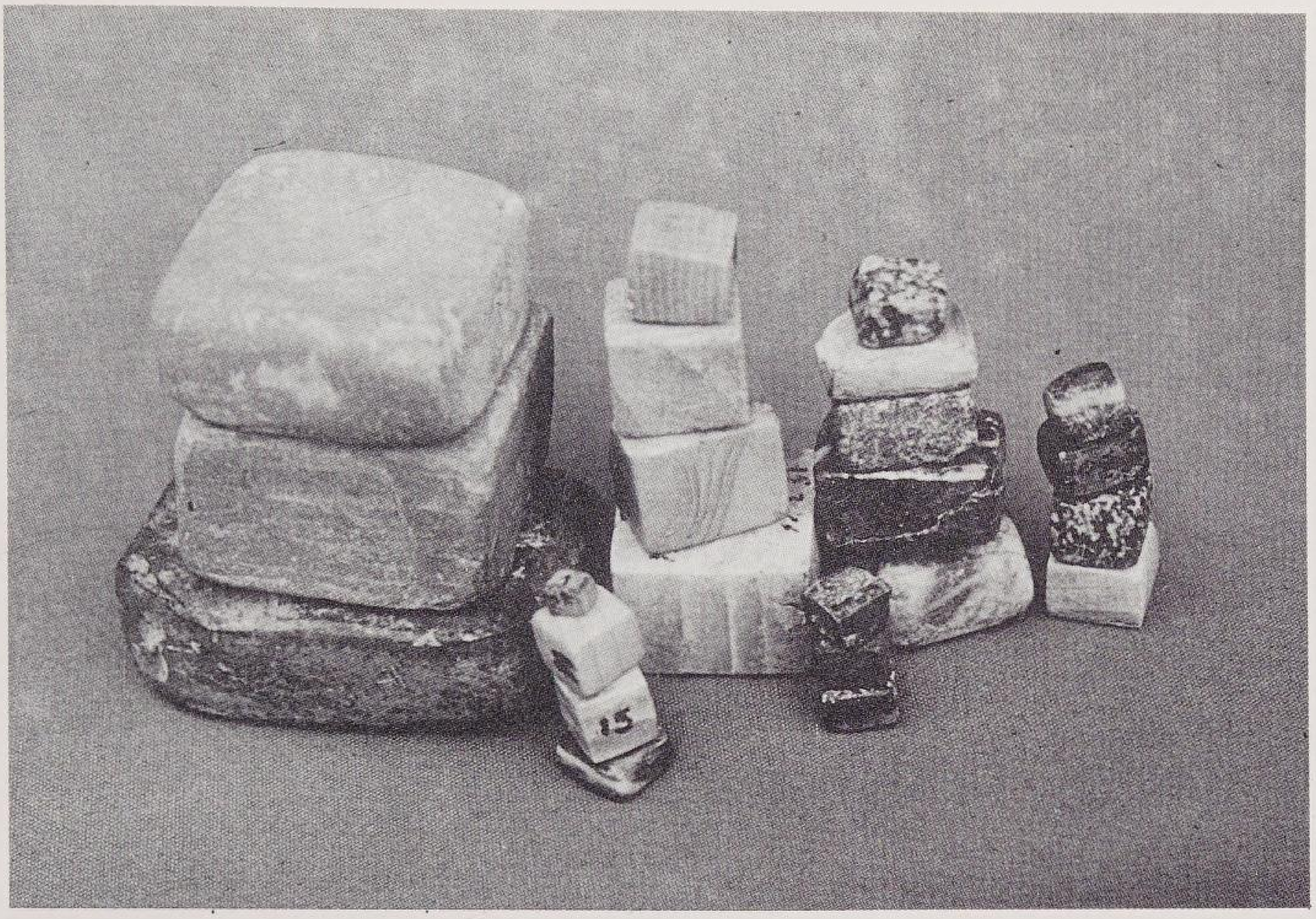
Pl. 10.15. Indus S-shaped jar.



Pl. 10.16. Indus seal.

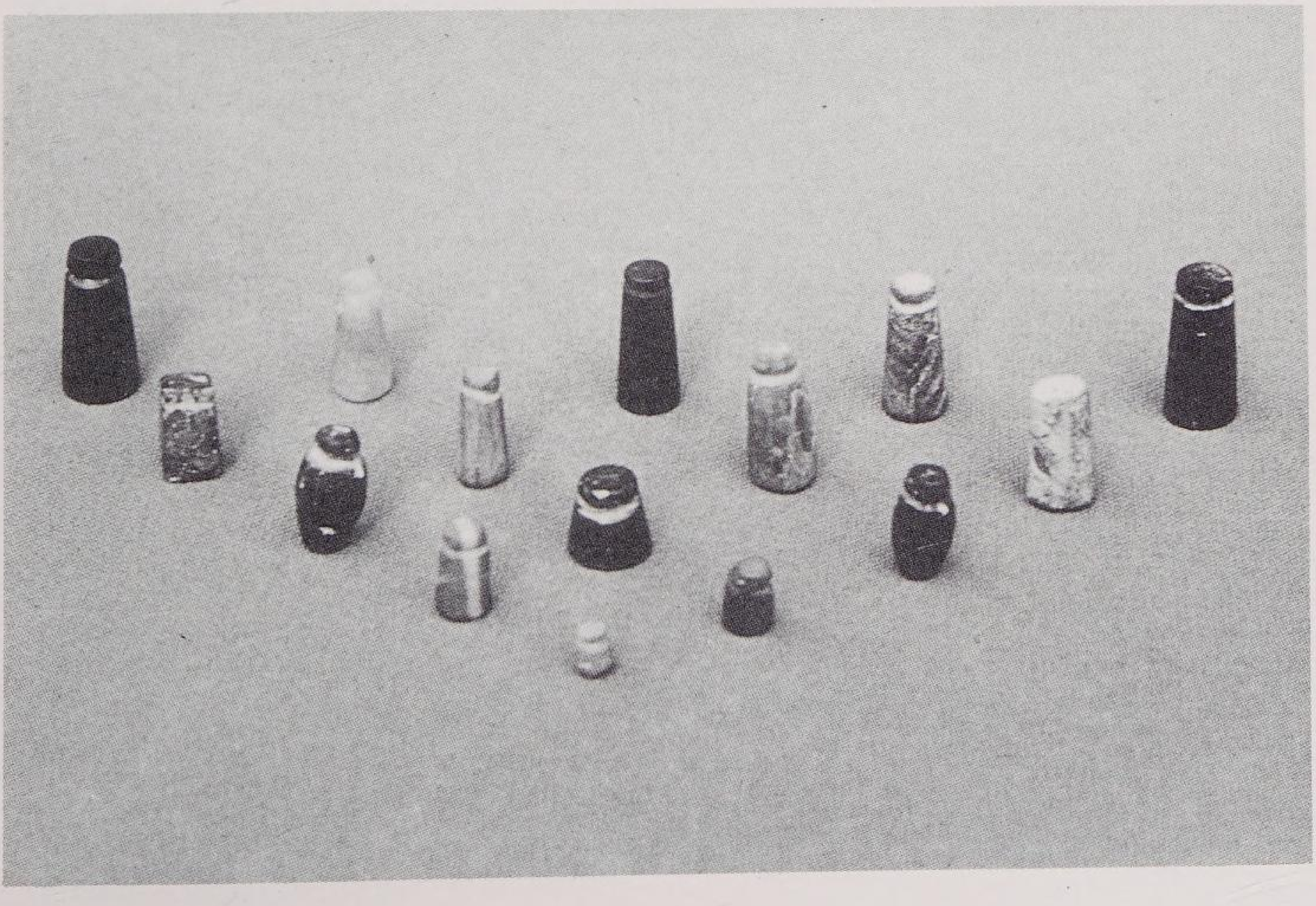
Pl. 10.17. Indus antiquities.

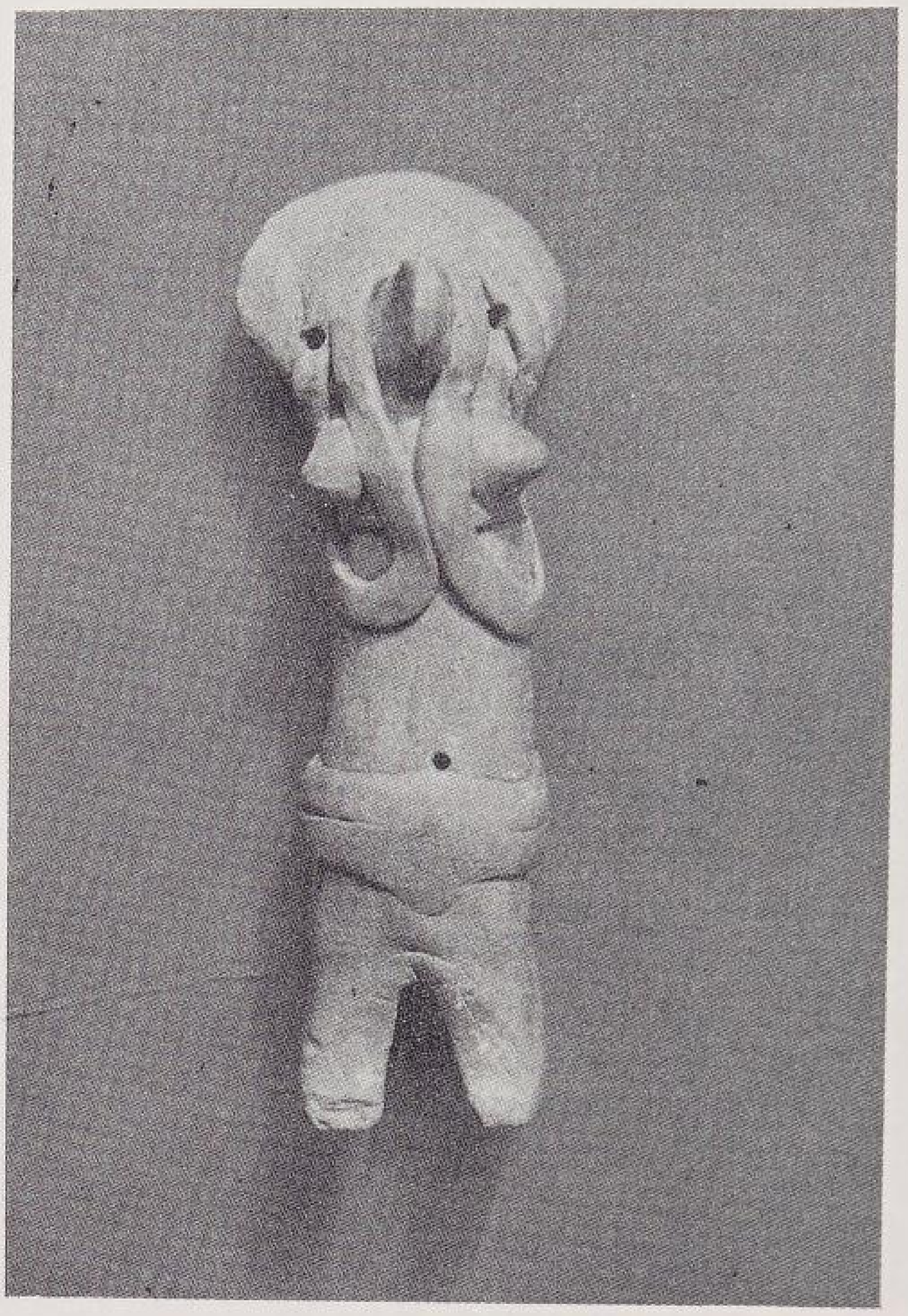

ORNAMENTS
BANAWALI
EXCAVATIONS



Pl. 10.18. Indus weights.

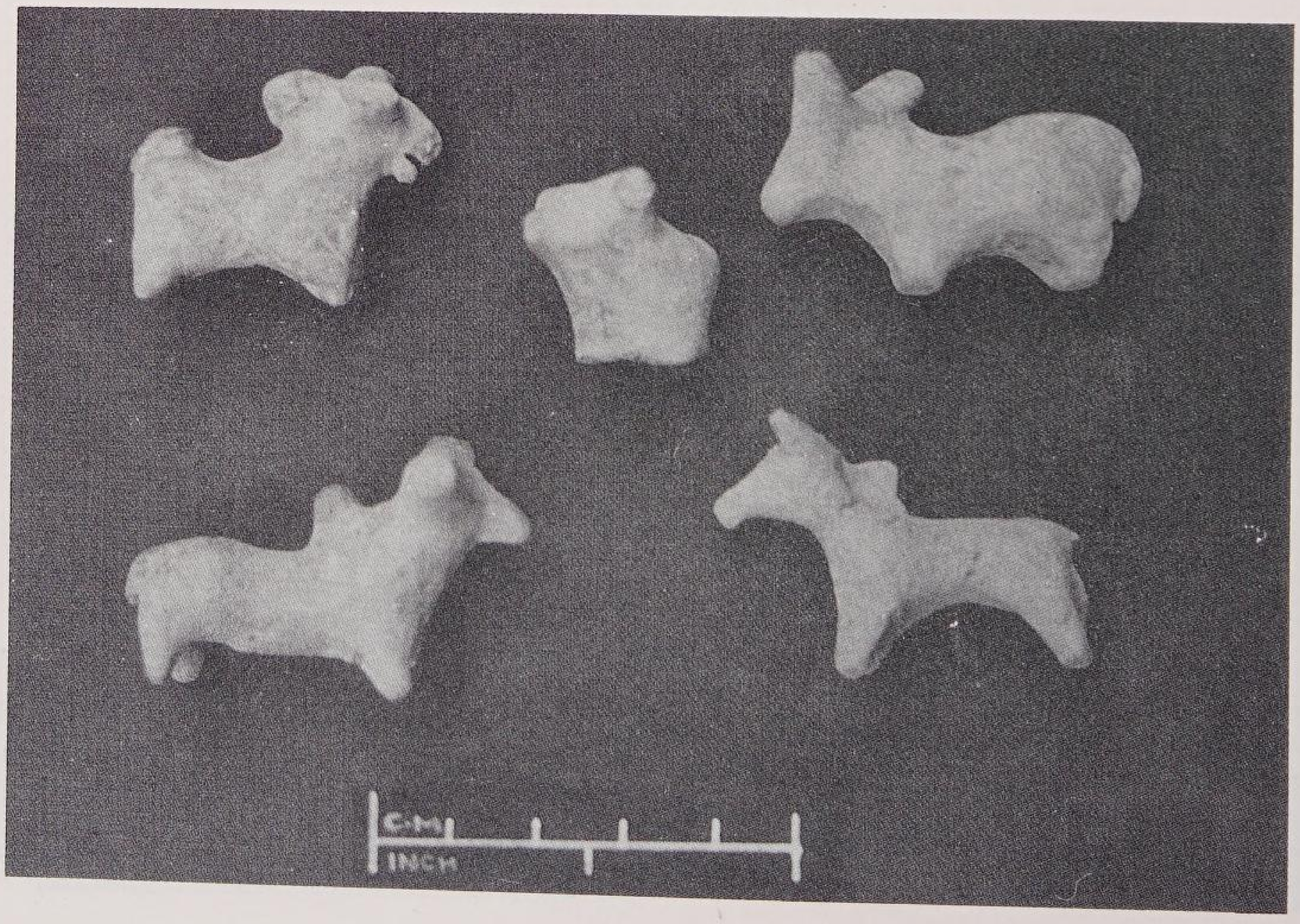
Pl. 10.19. Indus gamesmen.

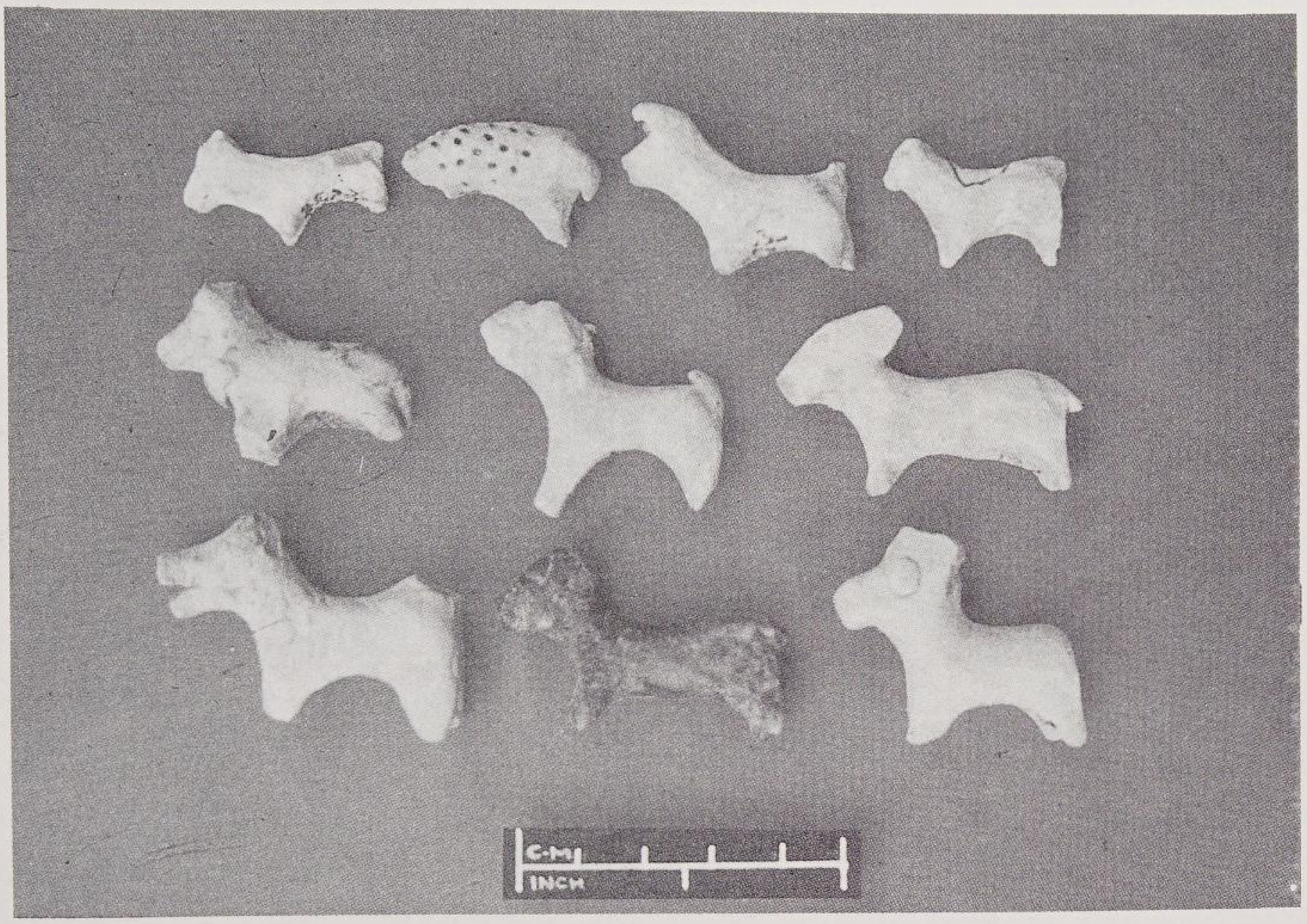




Pl. 10.20. Mother goddess.

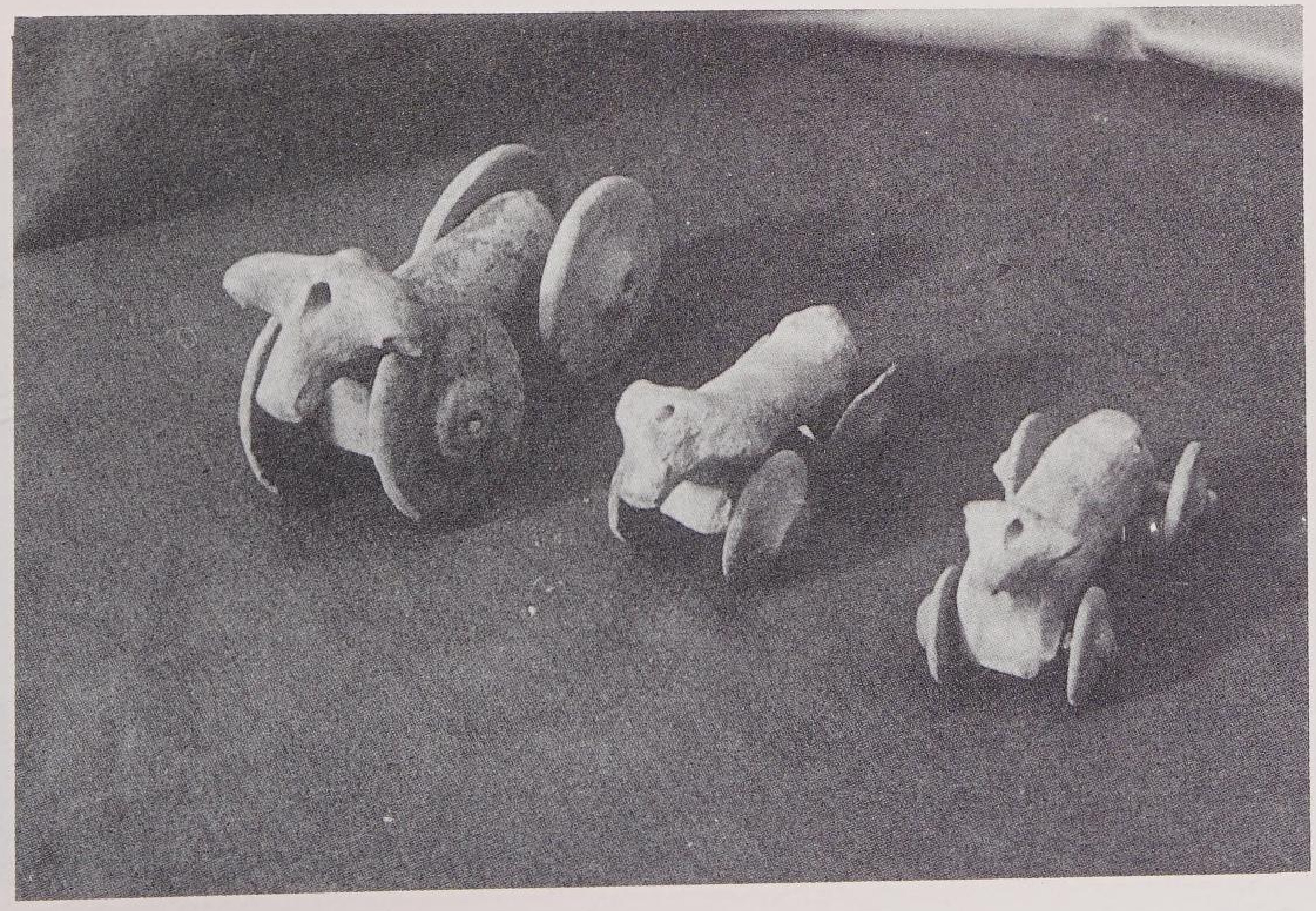
Pl. 10.21. Bull figurines of the Indus Period.

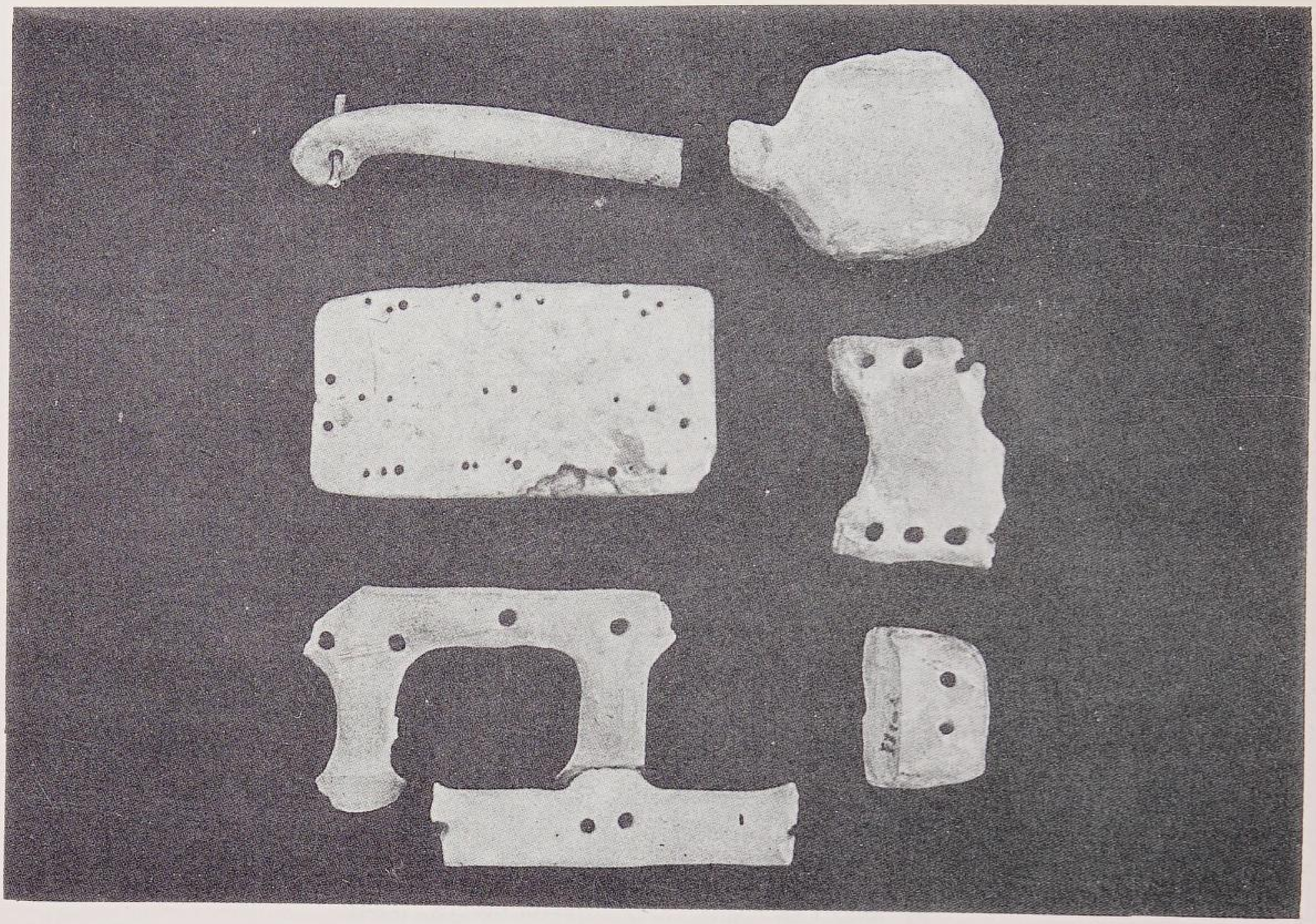




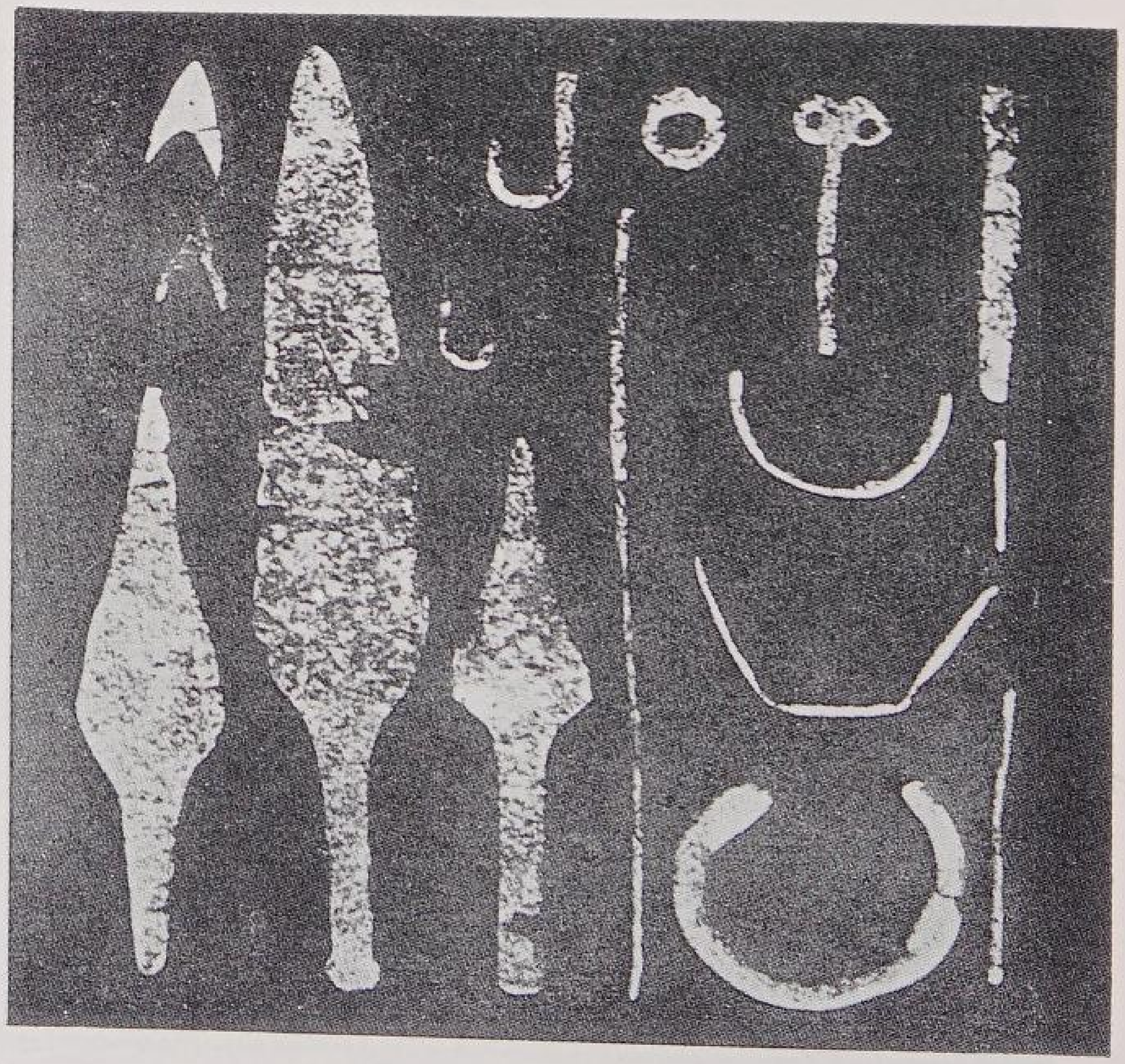
P1. 10.22. Clay figurines of animals from the Indus levels.

P1. 10.23. Wheeled terracottas.

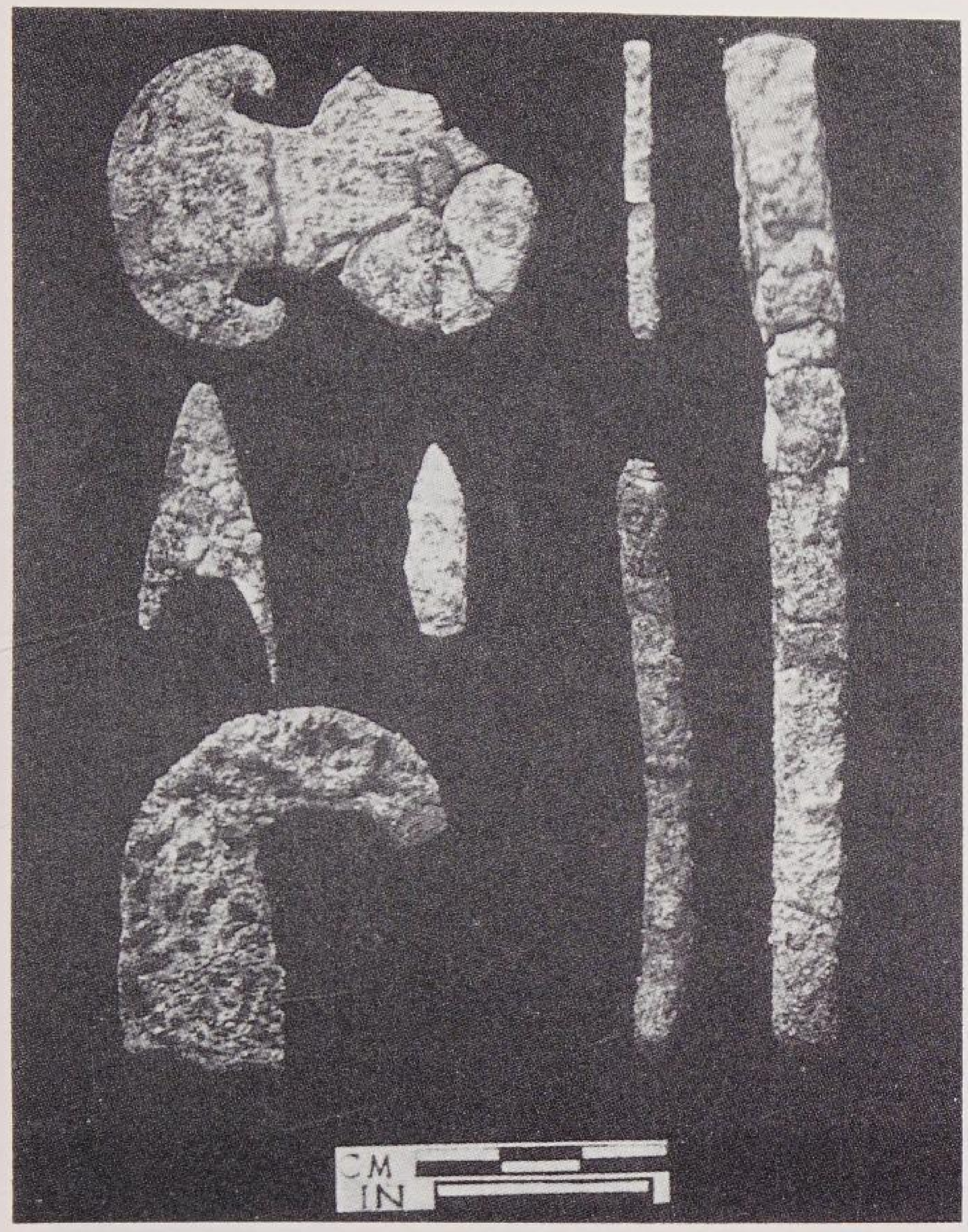




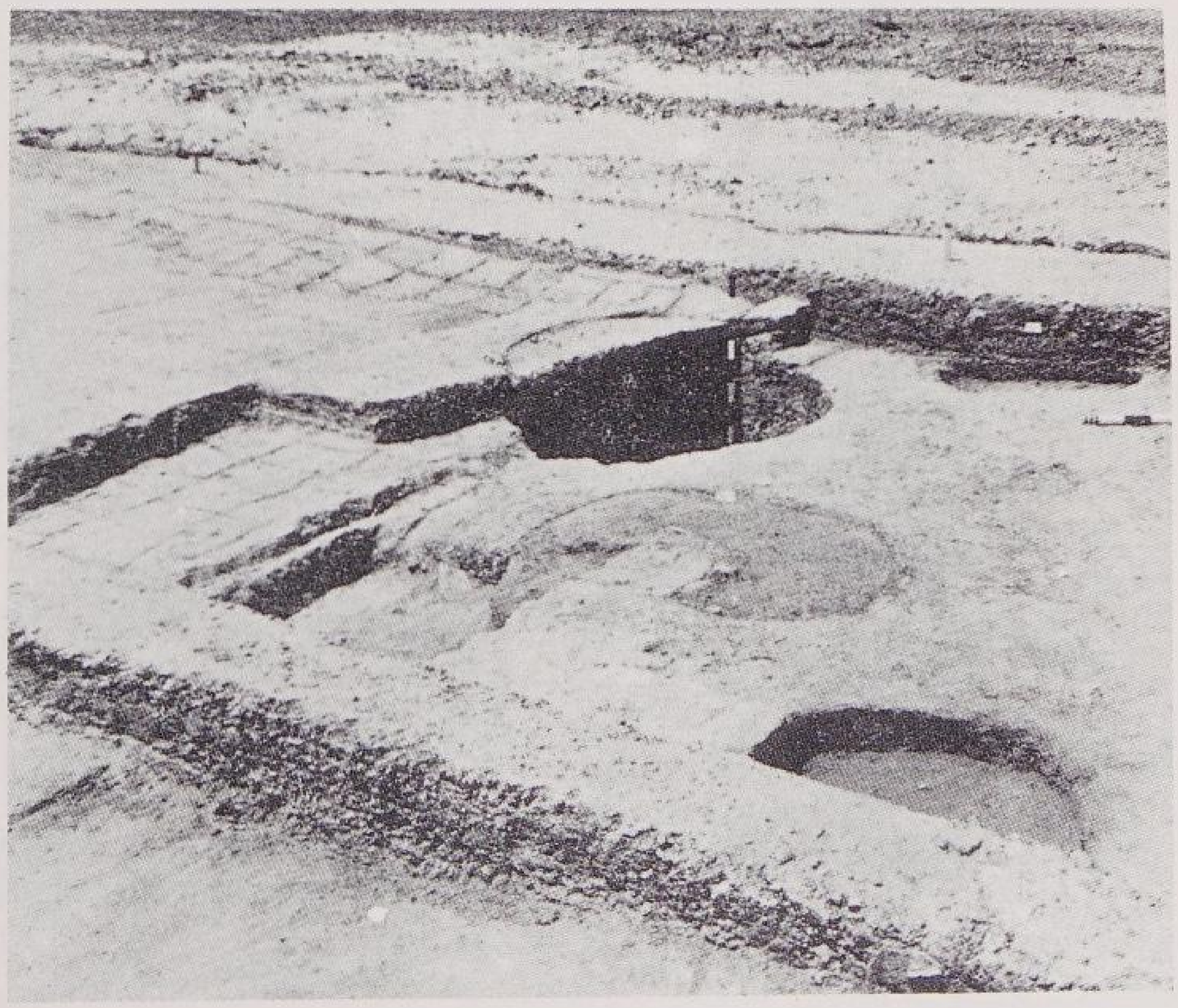
P1. 10.24. Cart frames and platforms.



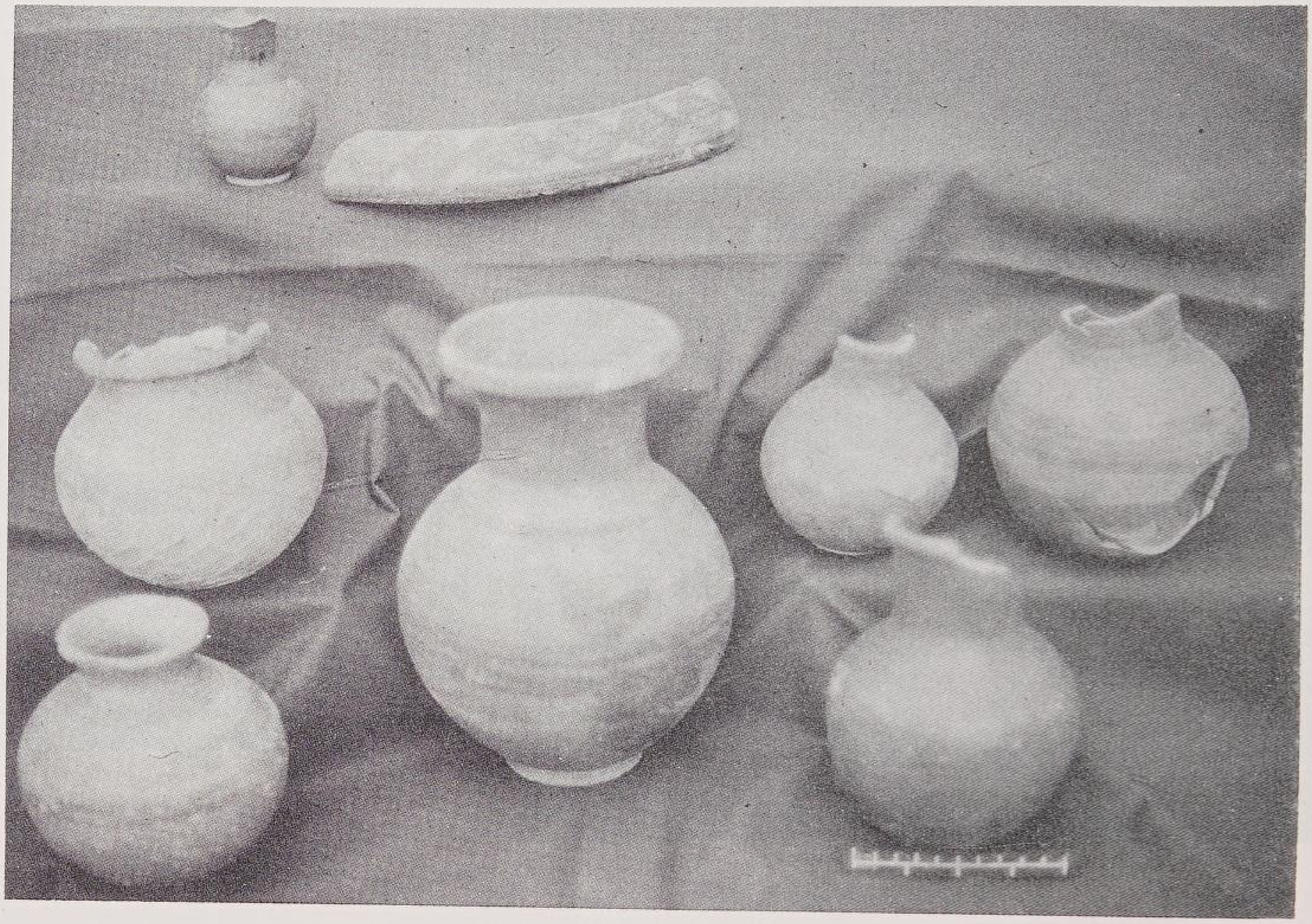
P1. 10.25. Indus copper implements.



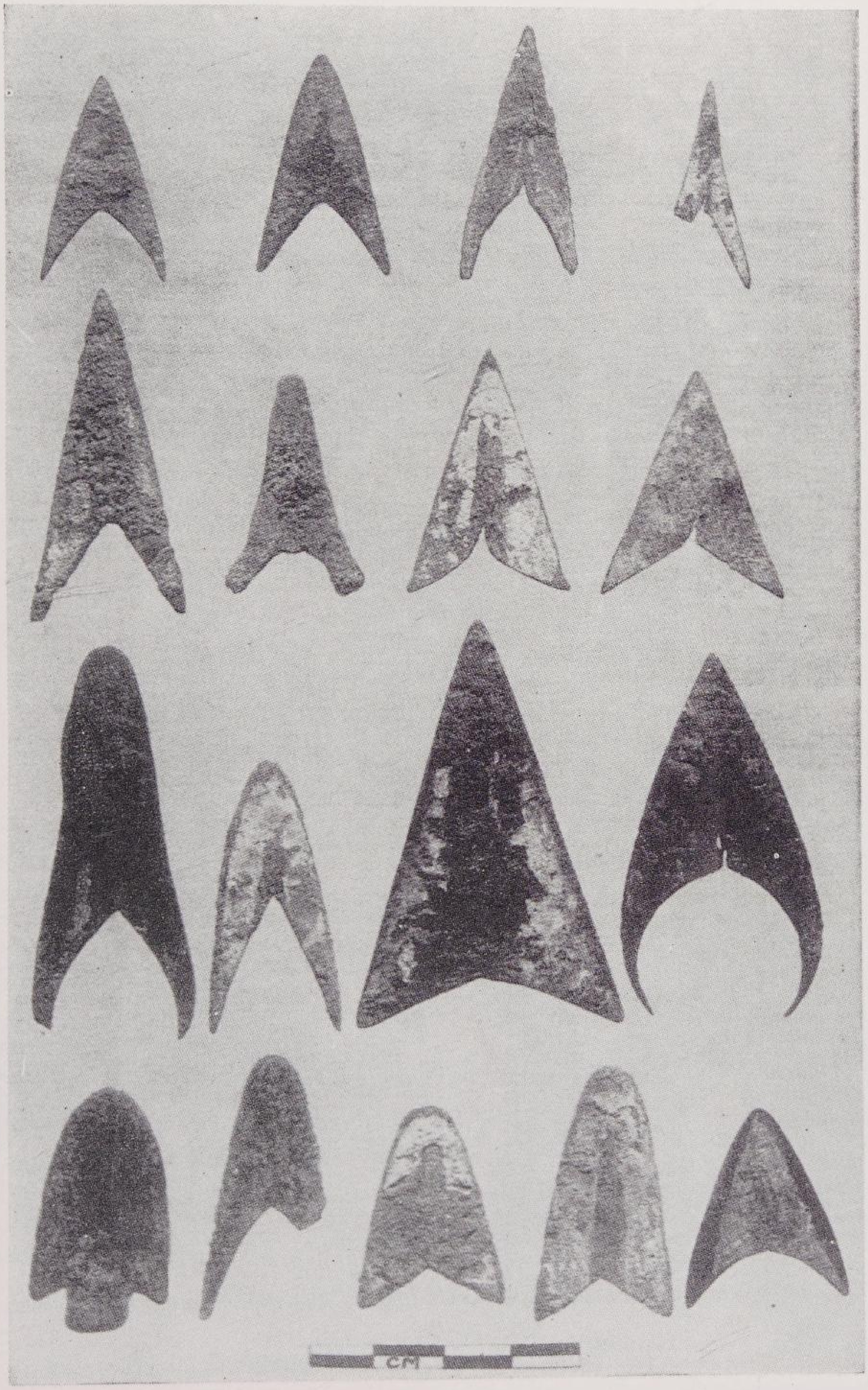
Pl. 10.26. Indus copper implements.



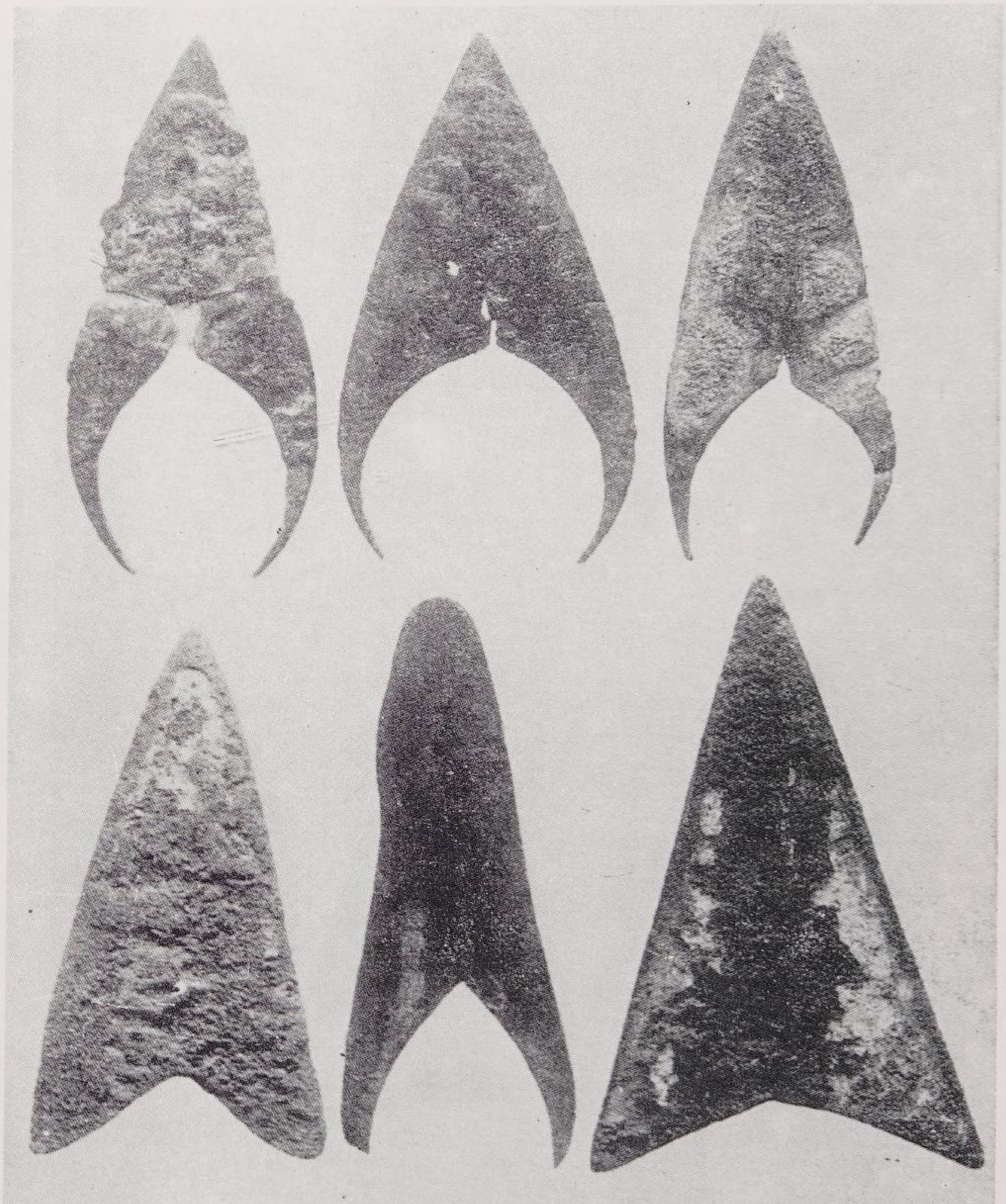
Pl. 10.27. Pits dug into, or near the top of the eastern arm of the town wall of the Indus Period.



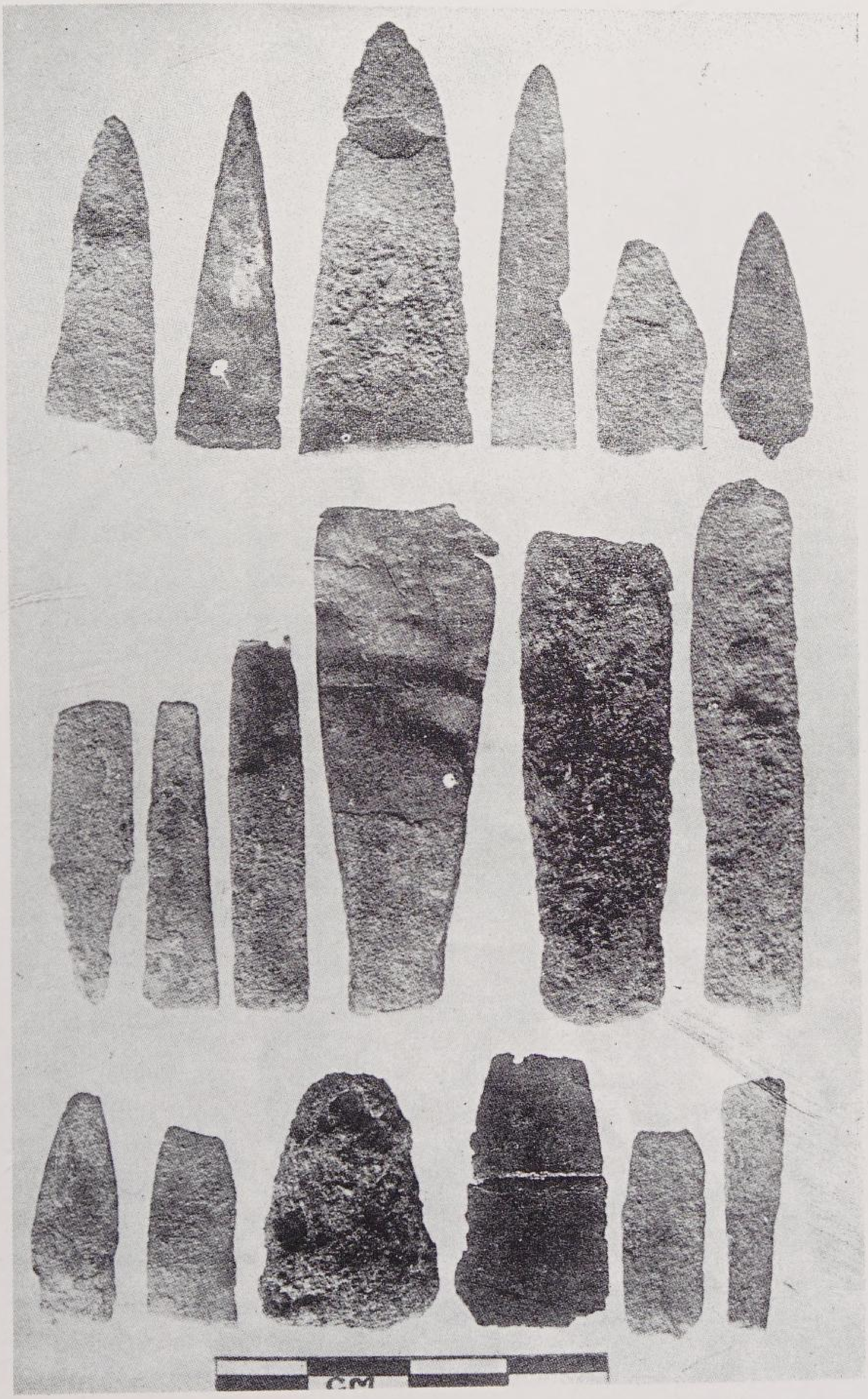
Pl. 10.28. Post-Indus Banawali-Bara Ware.



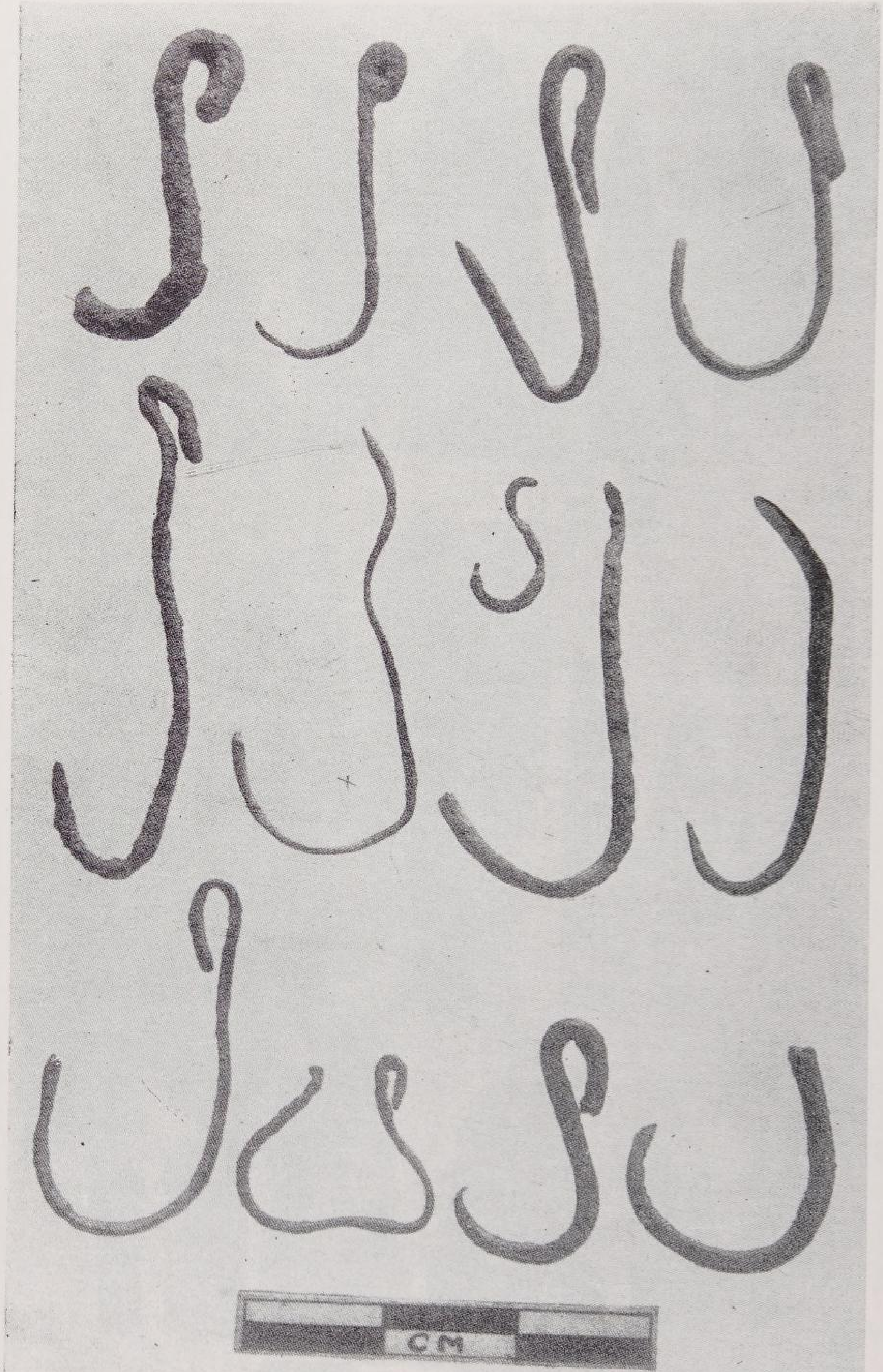
Pl. 11.1. Rich variety of copper arrow heads with wood shaft marks from Ganeshwar (Rajasthan). Third millennium B.C., OCP Complex.



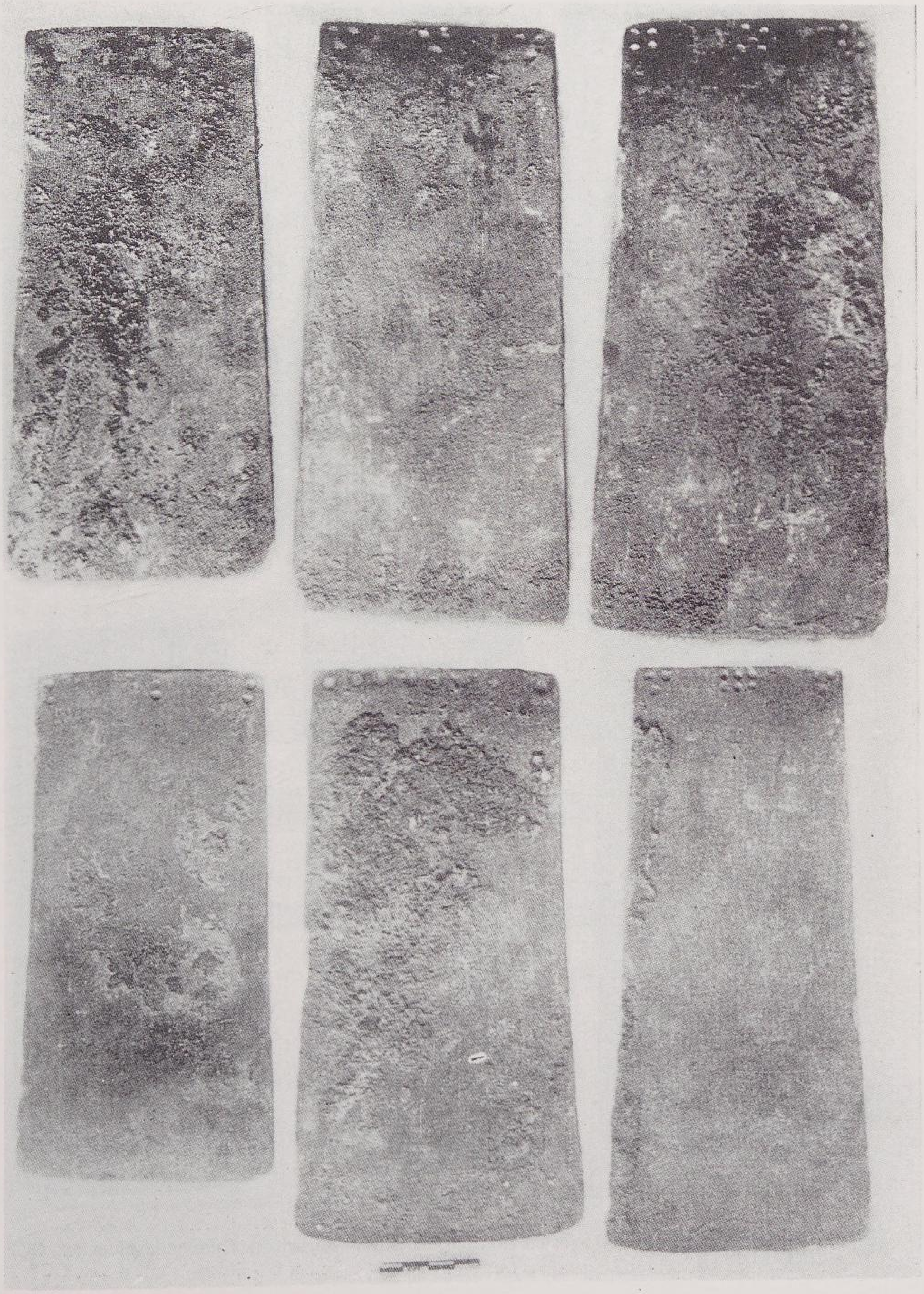
Pl. 11.2. Unique and artistic arrow heads from Ganeshwar. Third millennium B.C., OCP Complex.



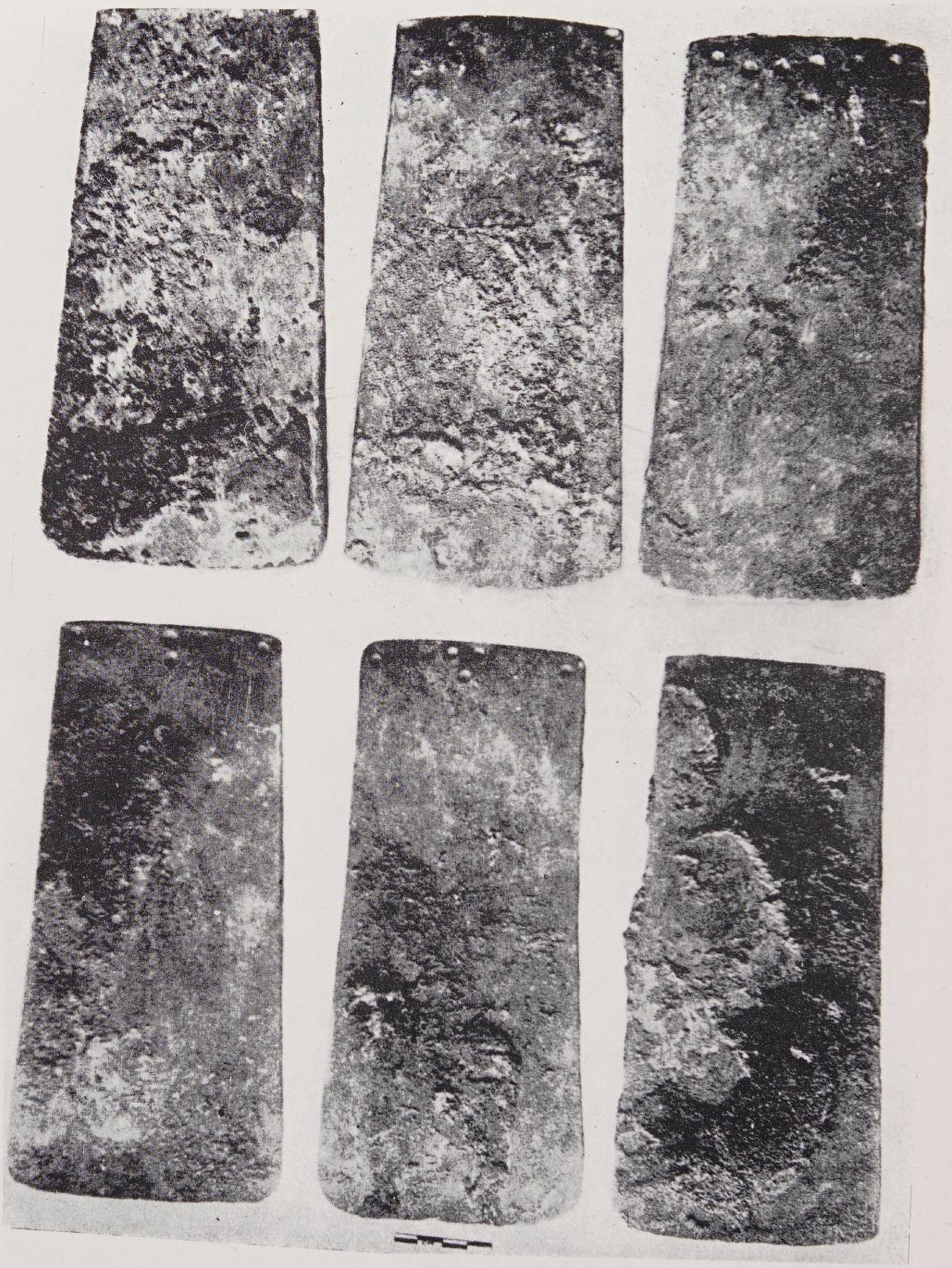
Pl. 11.3. Copper blades, knives and spear heads from Ganeshwar (Rajasthan). Third millennium B.C., OCP Complex.



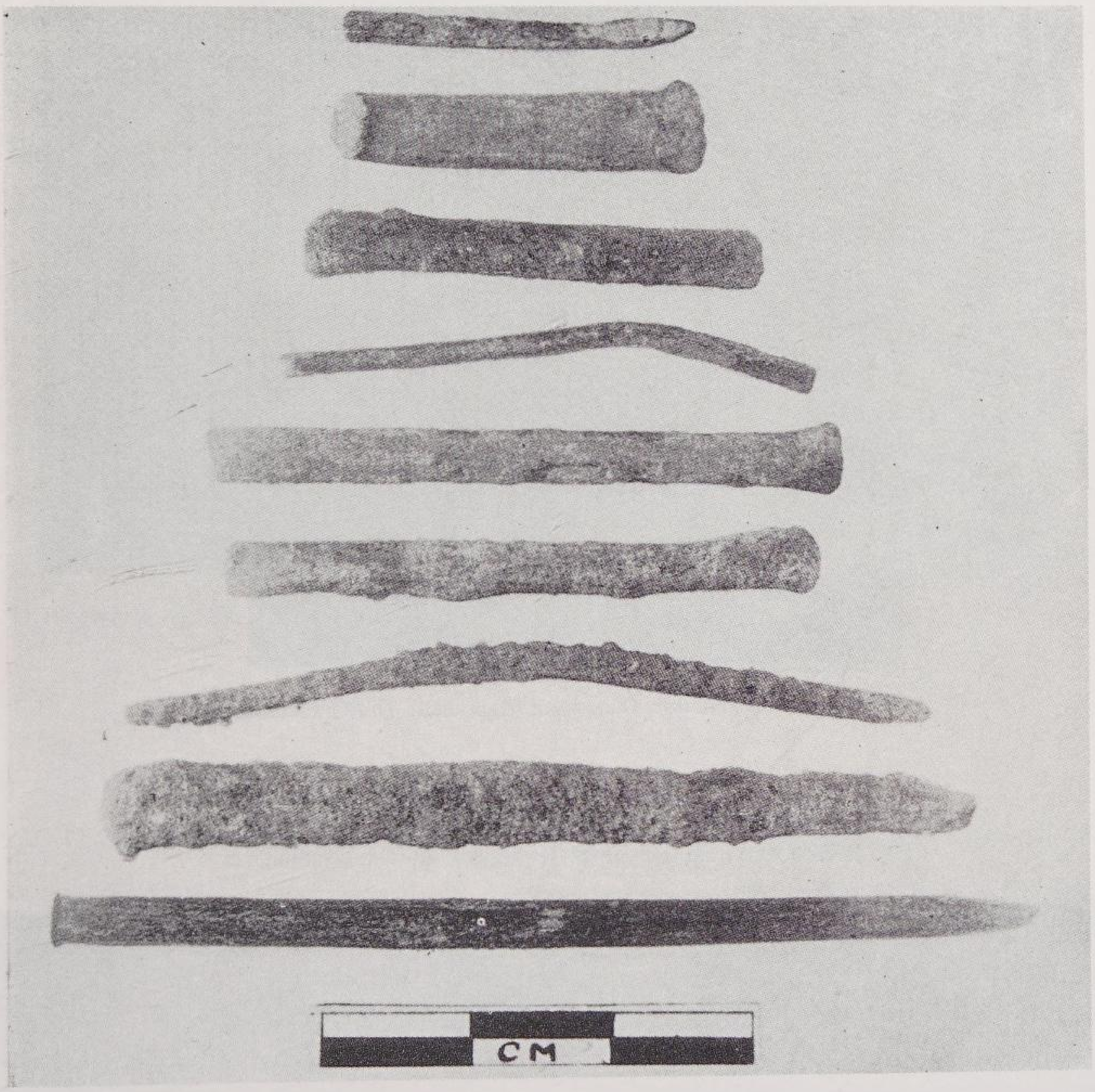
Pl. 11.4. Copper fish hooks from Ganeshwar (Rajasthan). Third millennium B.C., OCP Complex.



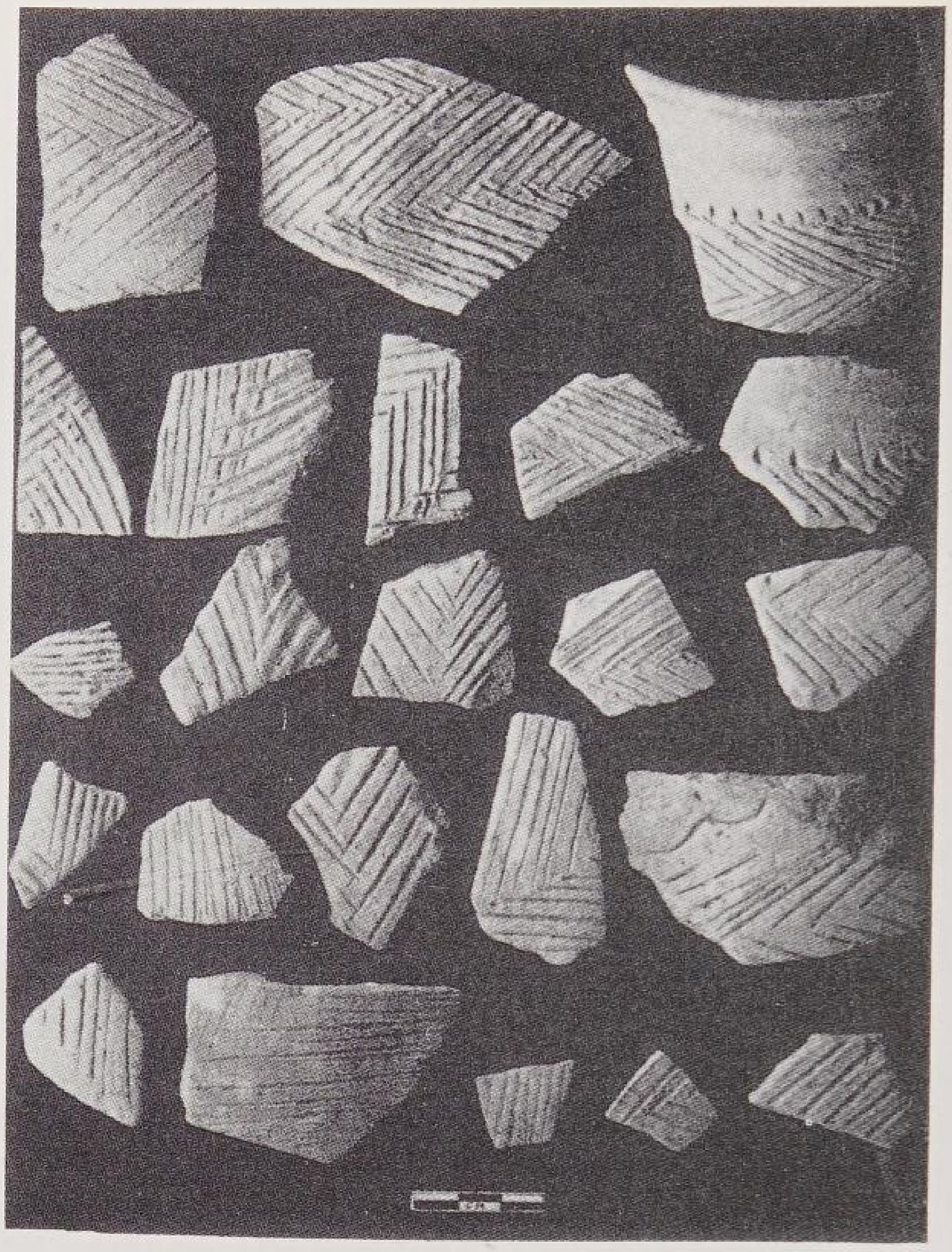
Pl. 11.5. Copper celts with various indentations from Ganeshwar (Rajasthan). Third millennium B.C., OCP Complex.



Pl. 11.6. Copper celts with various indentations from Ganeshwar (Rajasthan). Third millennium B.C., OCP Complex.

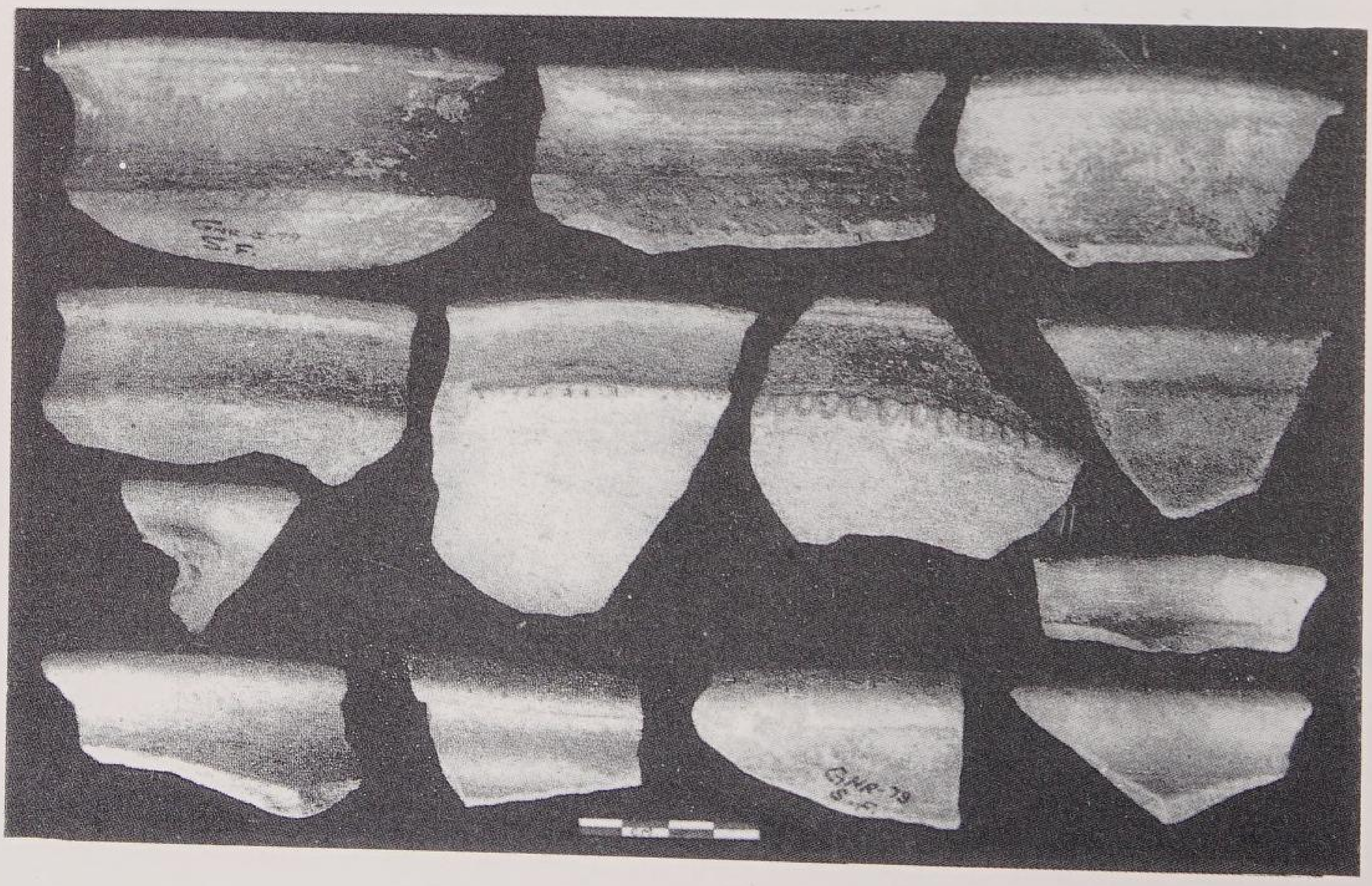


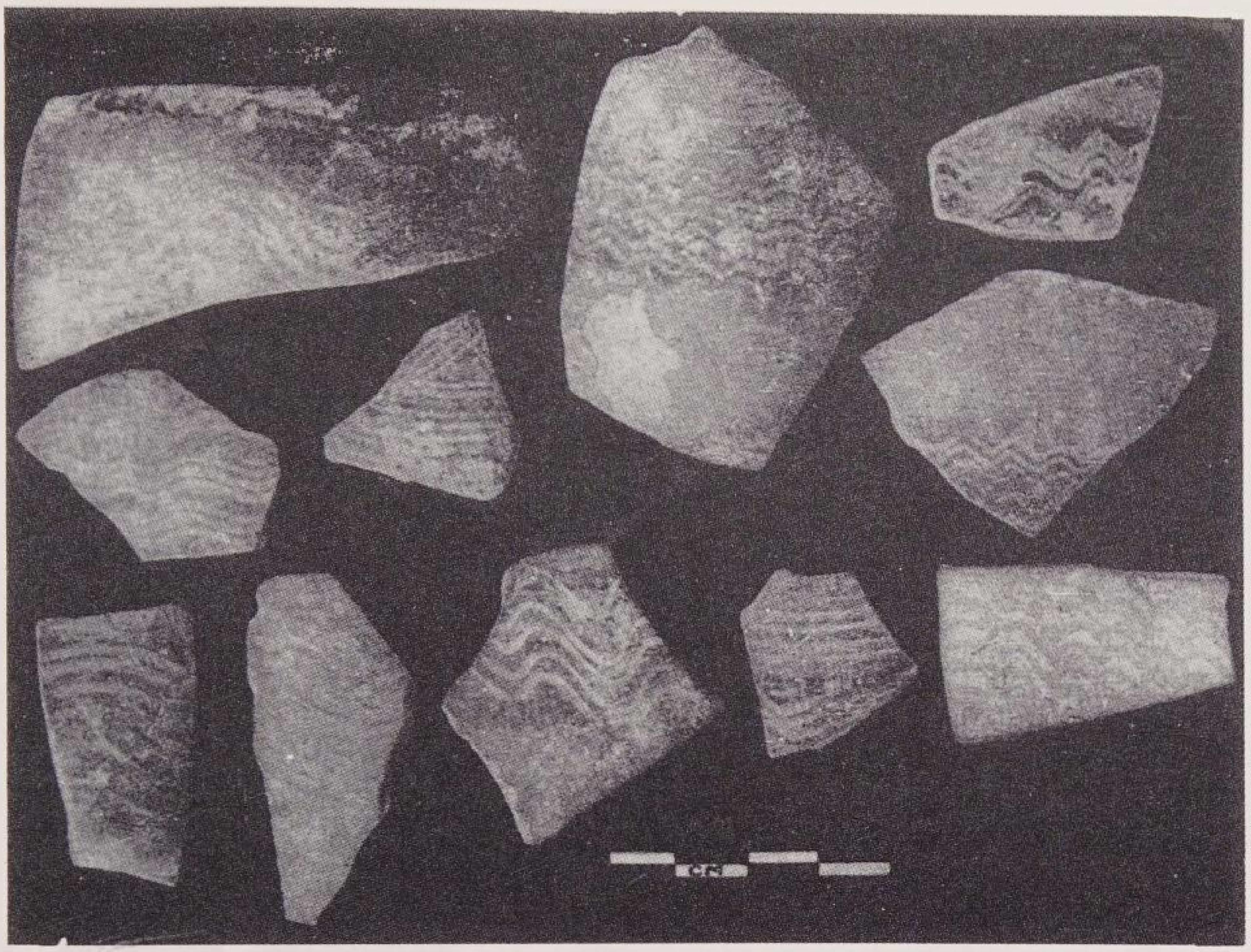
Pl. 11.7. Copper rods, chisels and a drill from Ganeshwar (Rajasthan). Third millennium B.C.



Pl. 11.8. OCP incised ware from Ganeshwar (Rajasthan). Third millennium B.C.

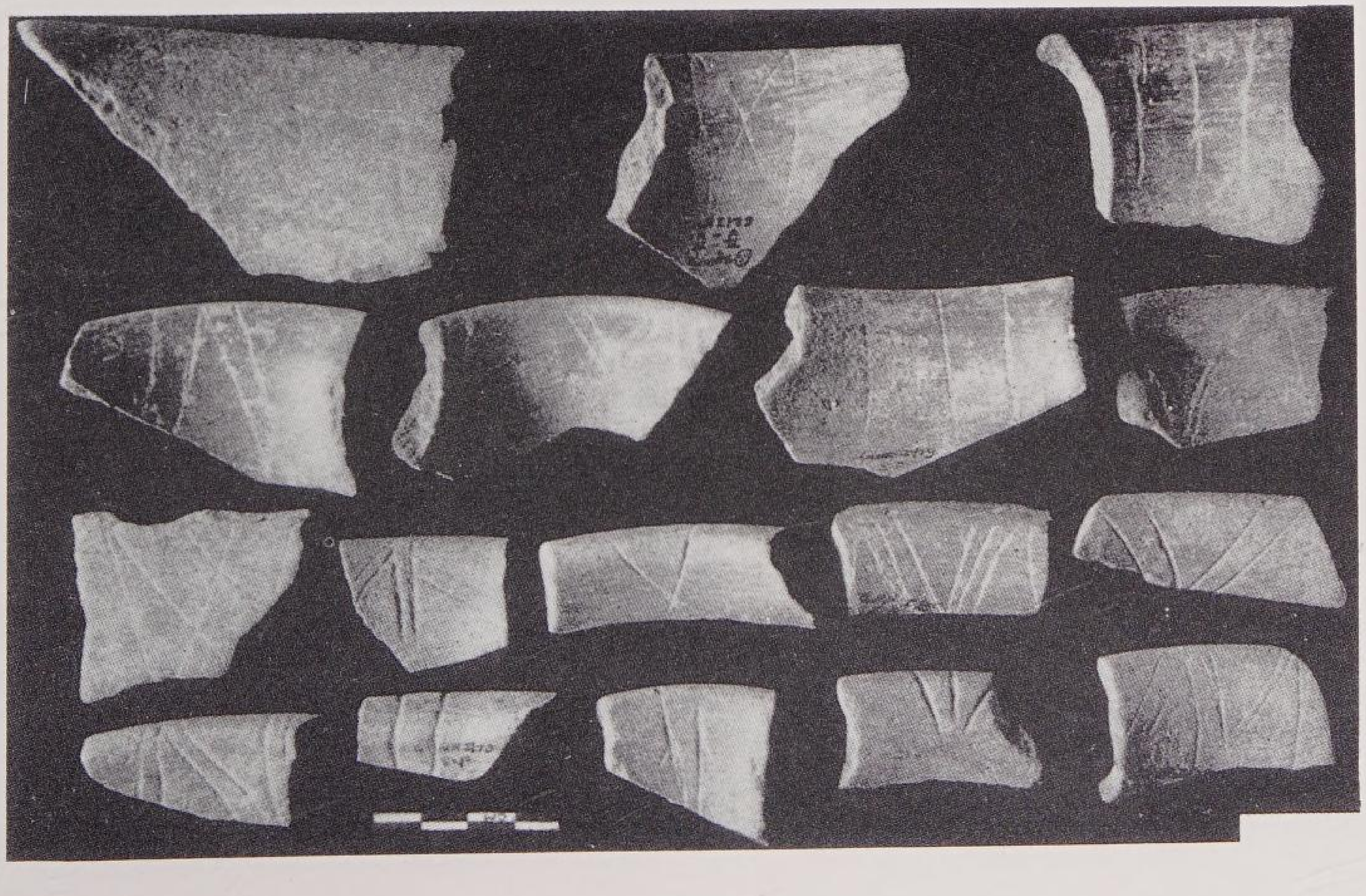
Pl. 11.9. OCP rims from Ganeshwar (Rajasthan). Third millennium B.C.

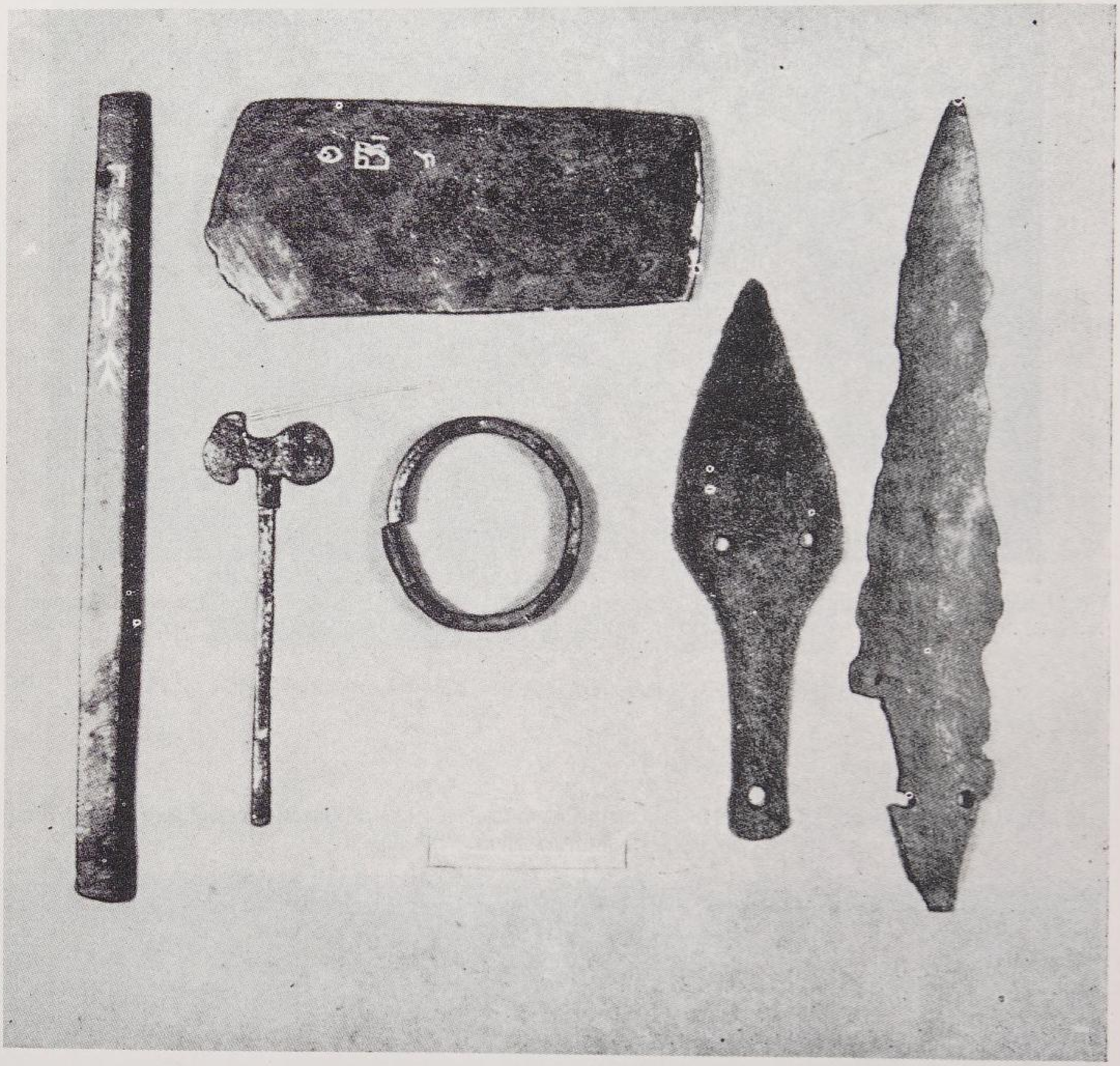




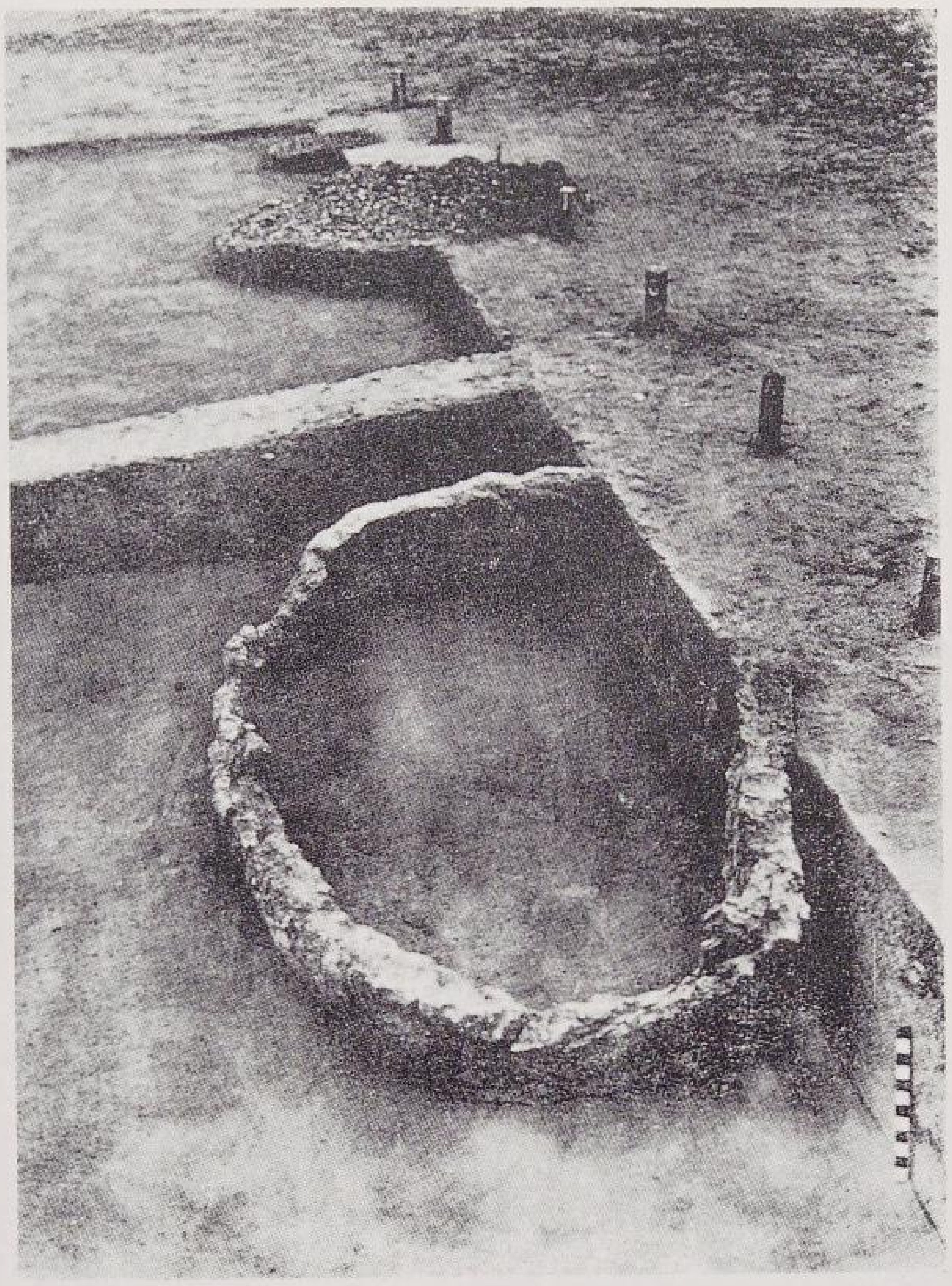
Pl. 11.10. Painted Red Ware with black designs associated with OCP at Ganeshwar (Rajasthan). Third millennium B.C.

Pl. 11.11. Characteristic graffiti marks incised on the interiors of OCP sherds. Ganeshwar-Jodhpura Culture. From Ganeshwar (Rajasthan). Third millennium B.C.

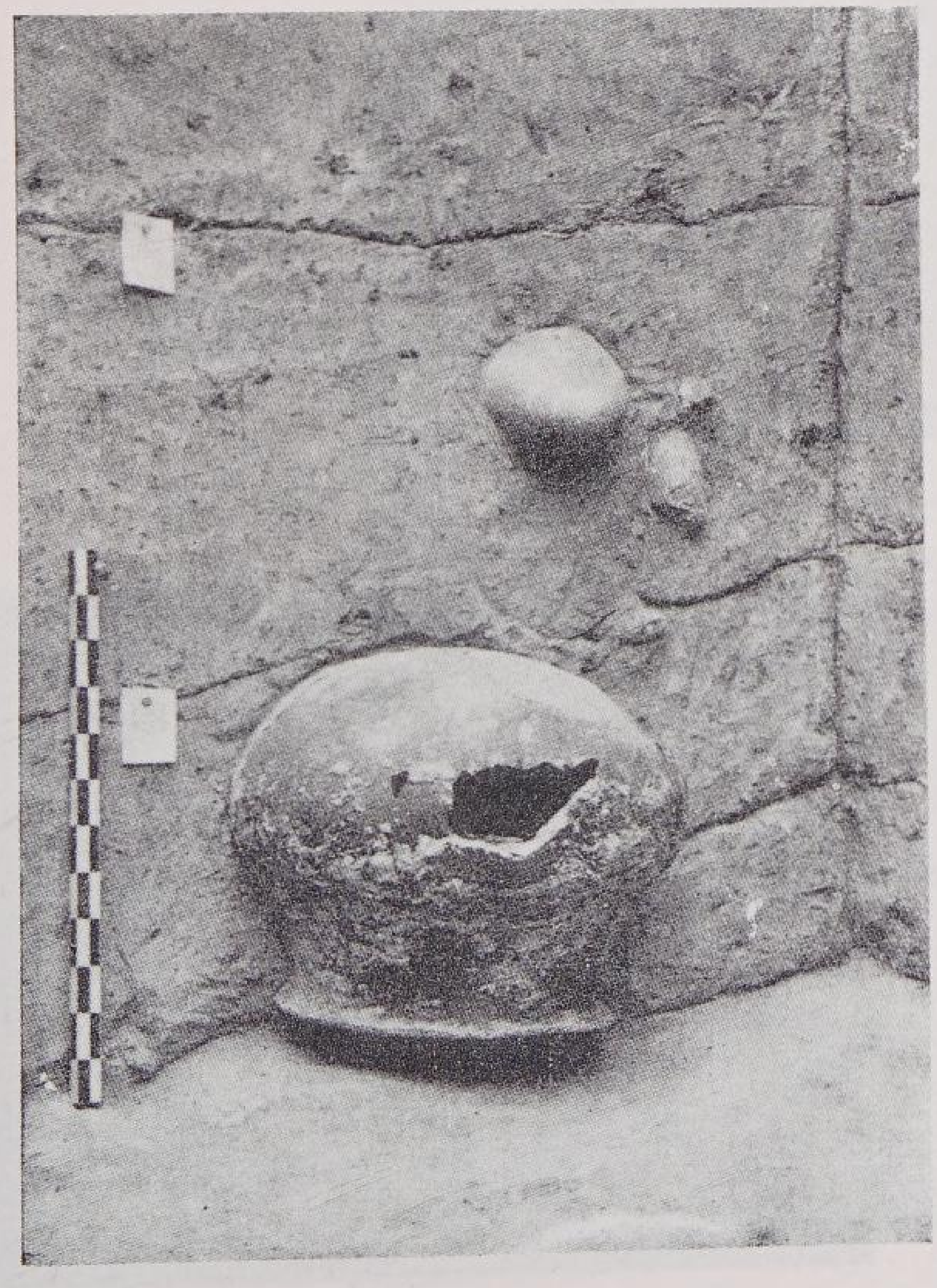




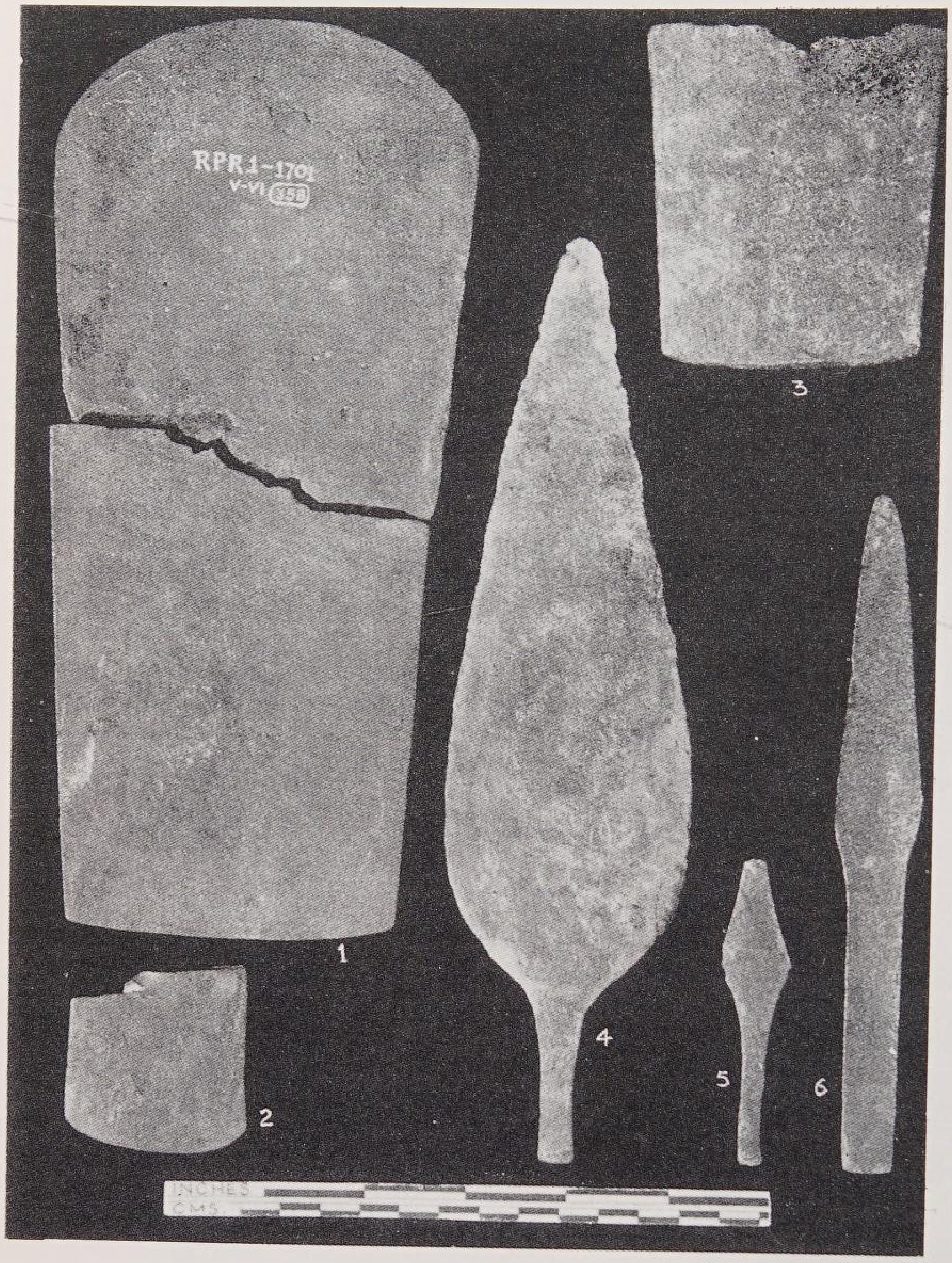
Pl. 11.12. Typical copper objects from the Mature Harappan levels of Kalibangan. Courtesy of B.K. Thapar and the Archaeological Survey of India.



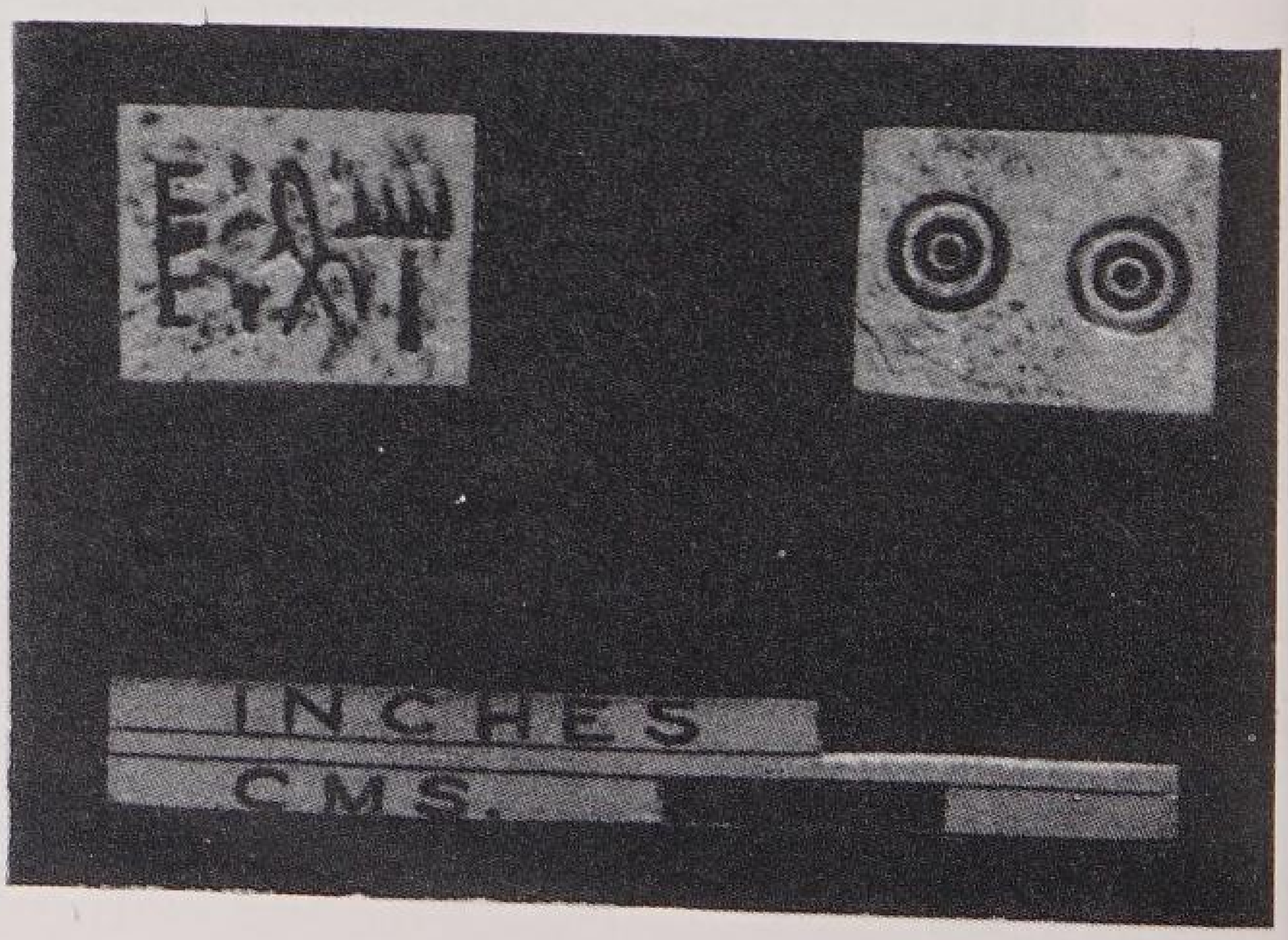
Pl. 13.1. Kotla Nihang: Small kilns in arow.



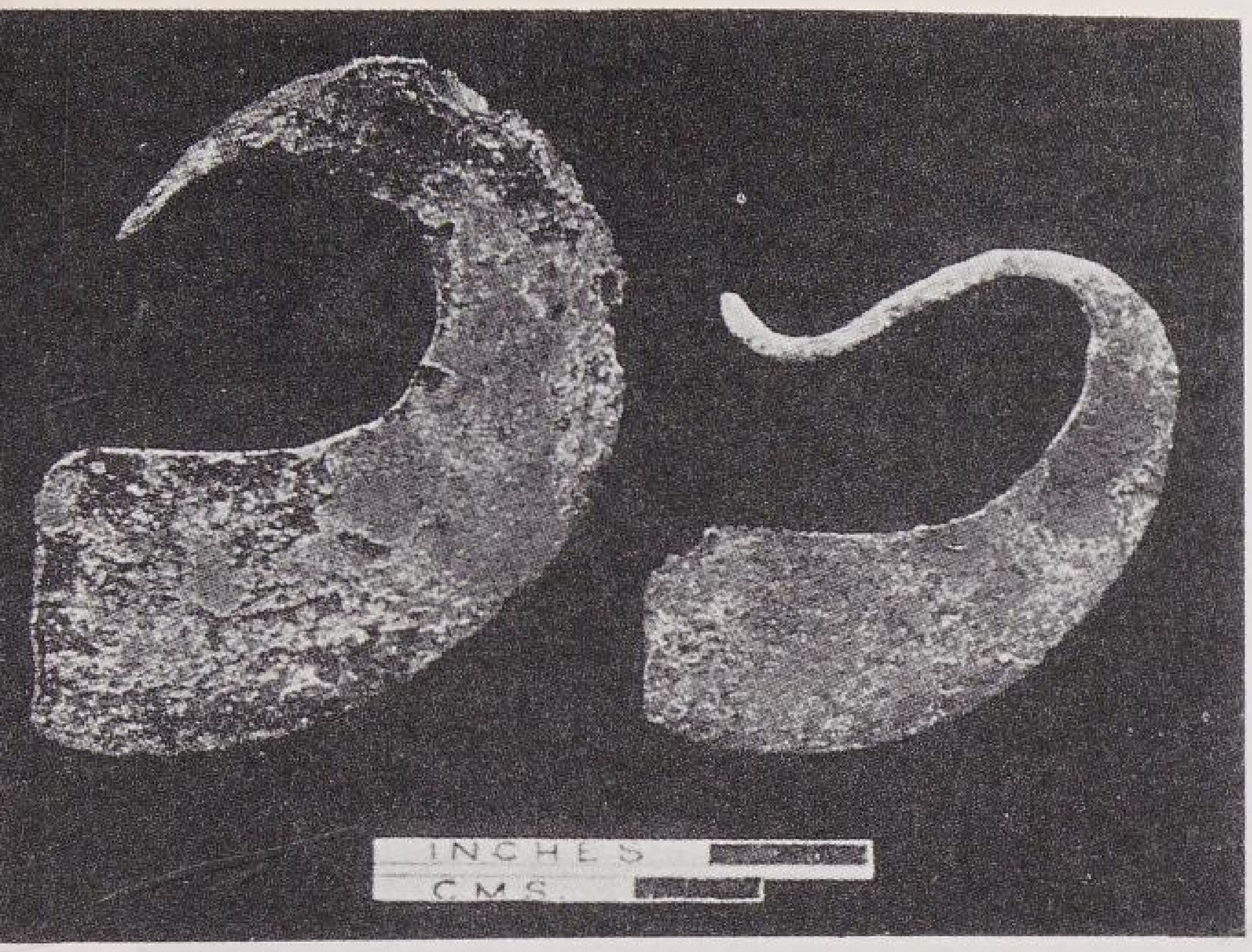
Pl. 13.2. Ropar: Bronze jar *in situ* in IA level.


RPR1-1701
V-VI 358
1
2
3
4
5
6
INCHES
CMS.

Pl. 13.3. Ropar: Bronze implements from IA and IB levels.

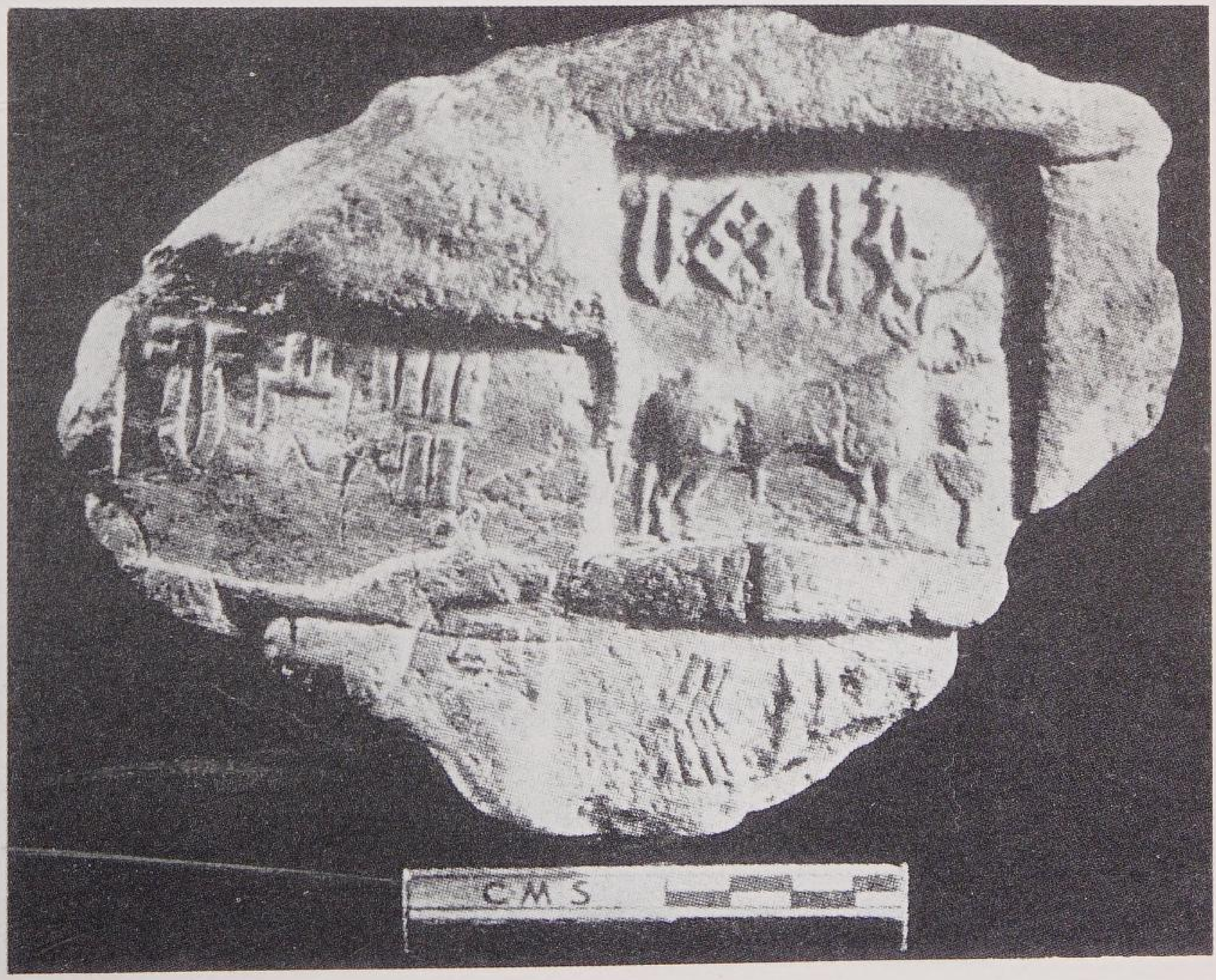


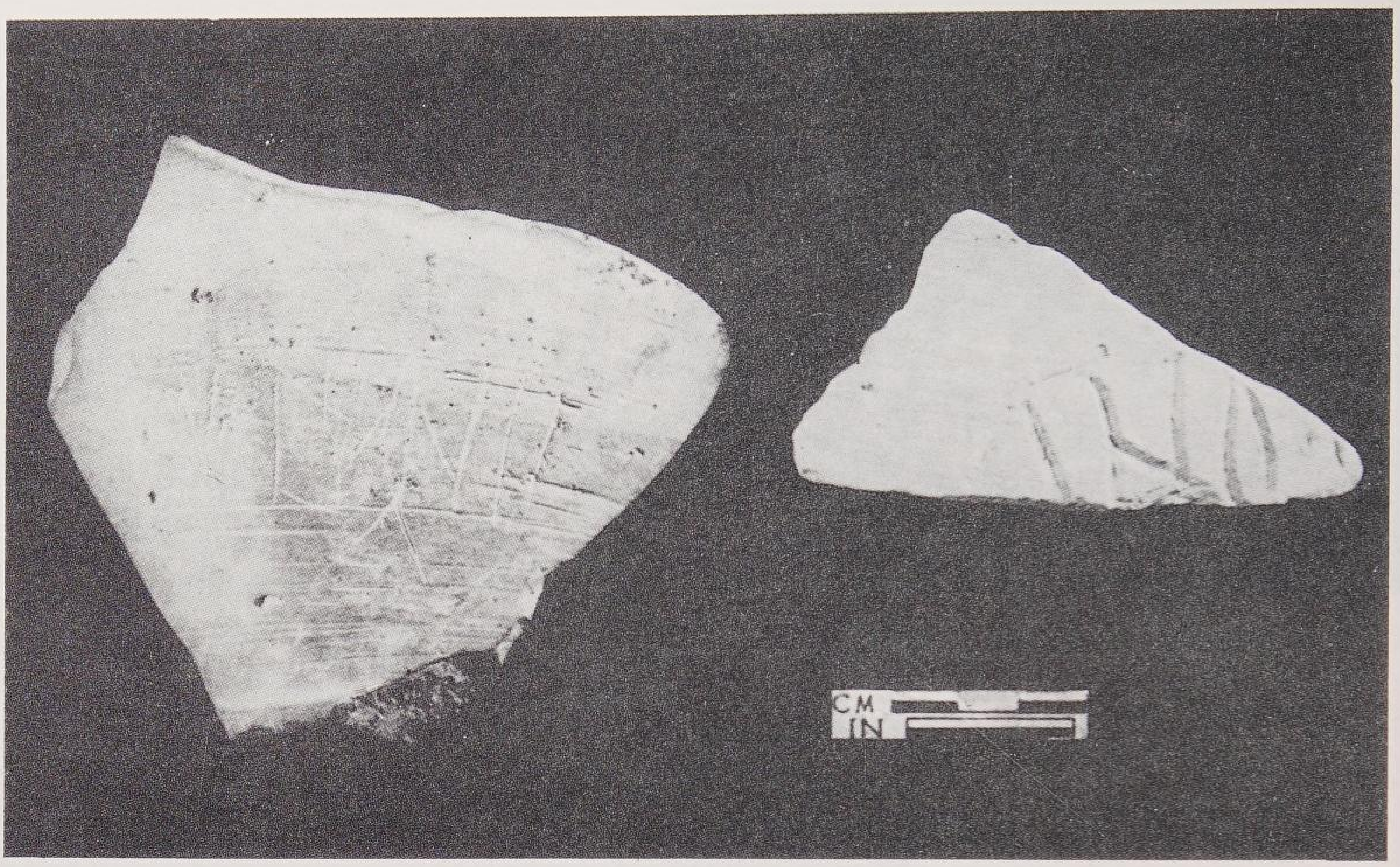
Pl. 13.4. Ropar: Small steatite seals.



Pl. 13.5. Ropar: Bronze razor blades from IB levels.

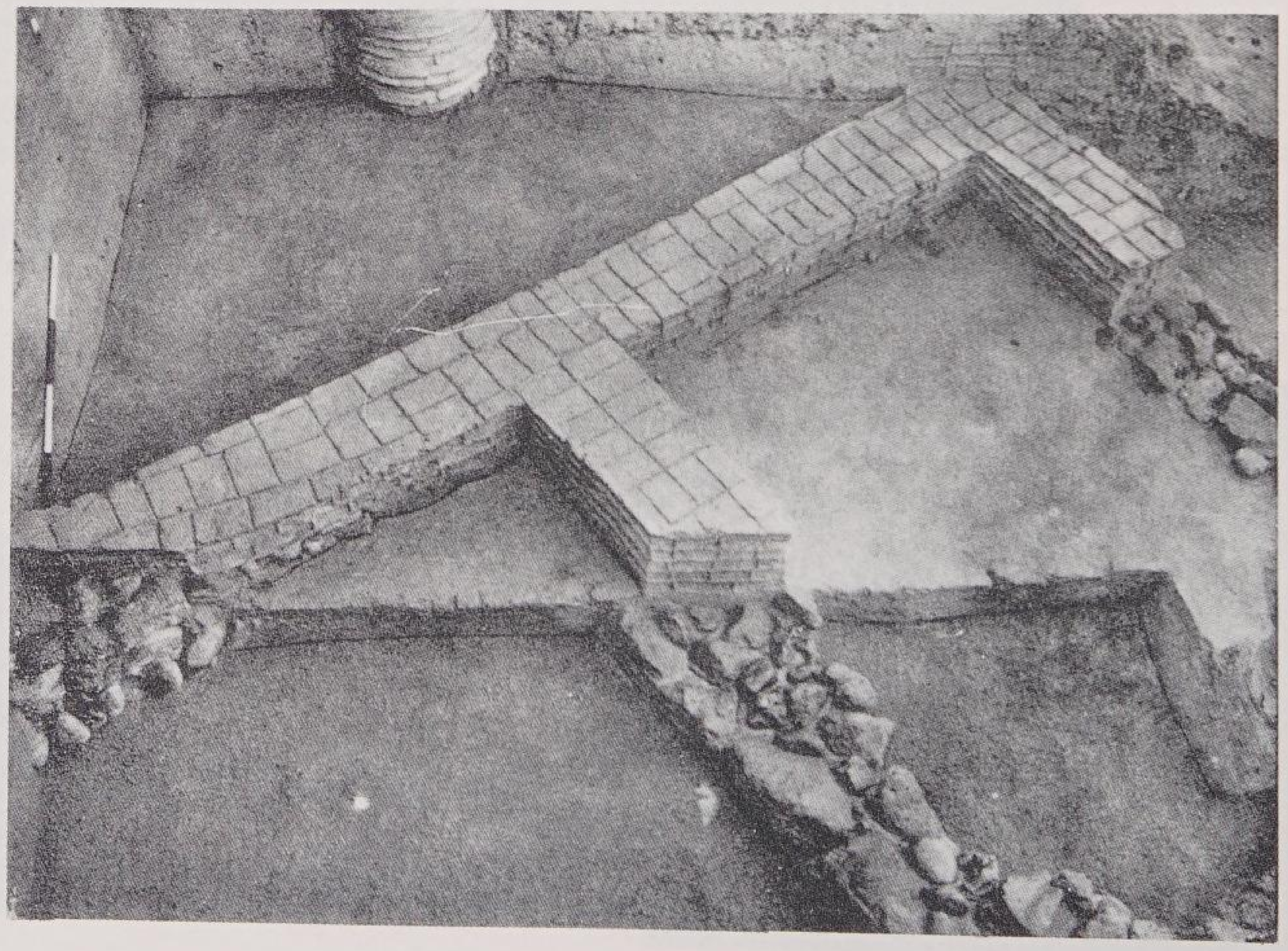
Pl. 13.6. Ropar: Baked clay sealing with impressions of three seals.

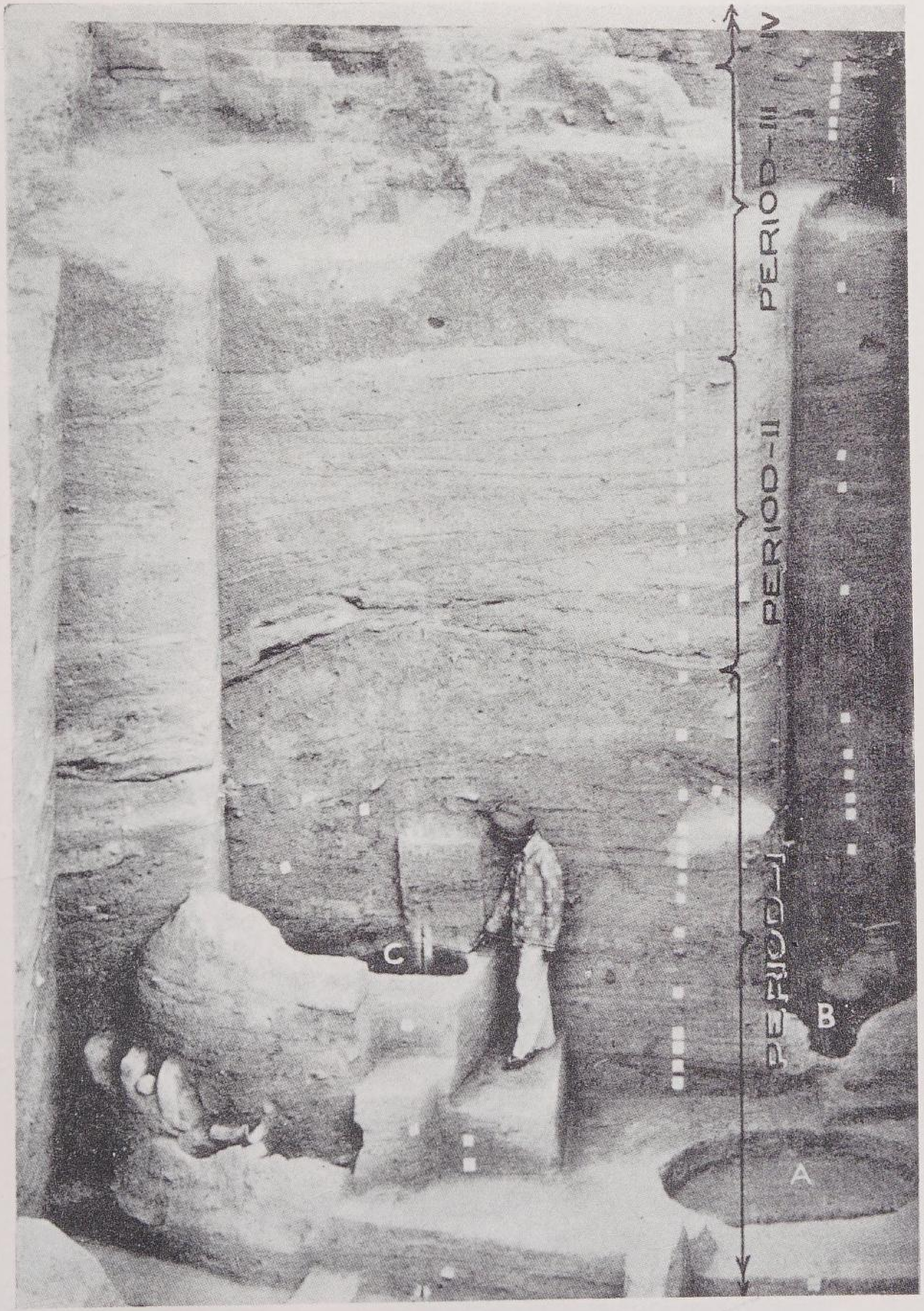




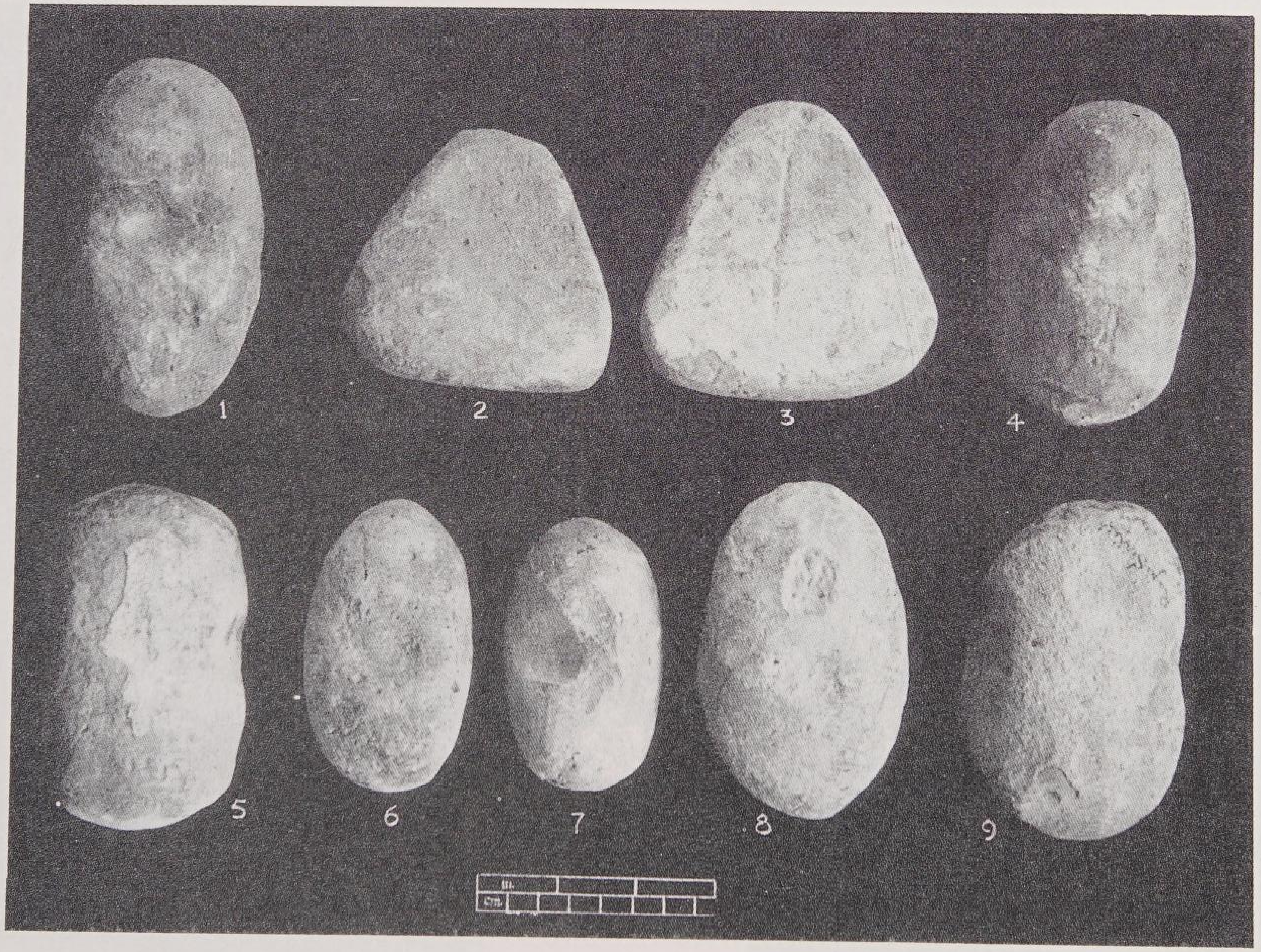
P1. 13.7. Ropar: Harappan graffiti on sherds.

P1. 13.8. Ropar: Mud brick walls with stone foundations.




IV
PERIOD–III
PERIOD–II
PERIOD–I
C
B
A

Pl. 13.9. Sanghol: Section cutting with potter's house. A. storage bin; B. kiln; C. fireplace.

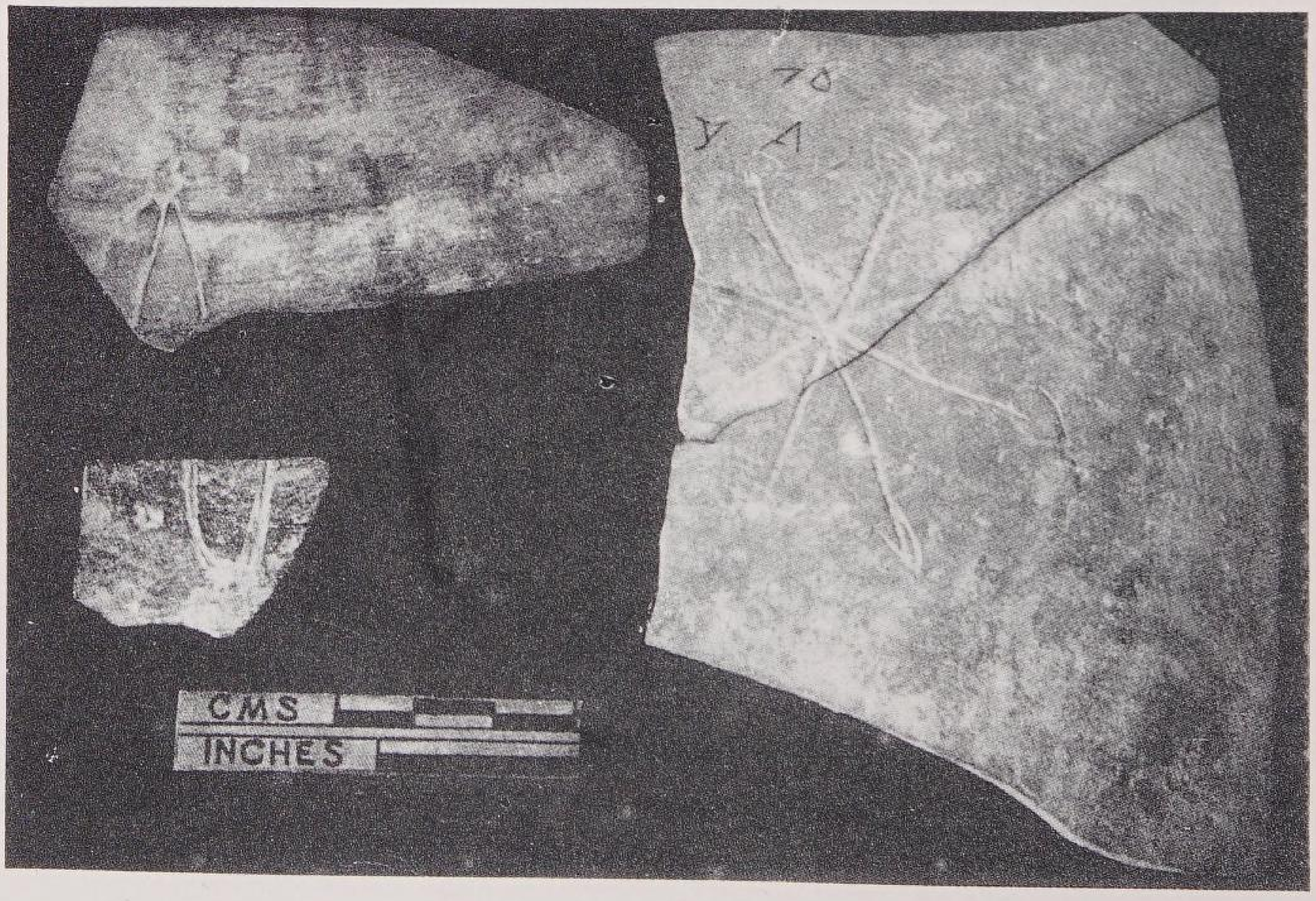


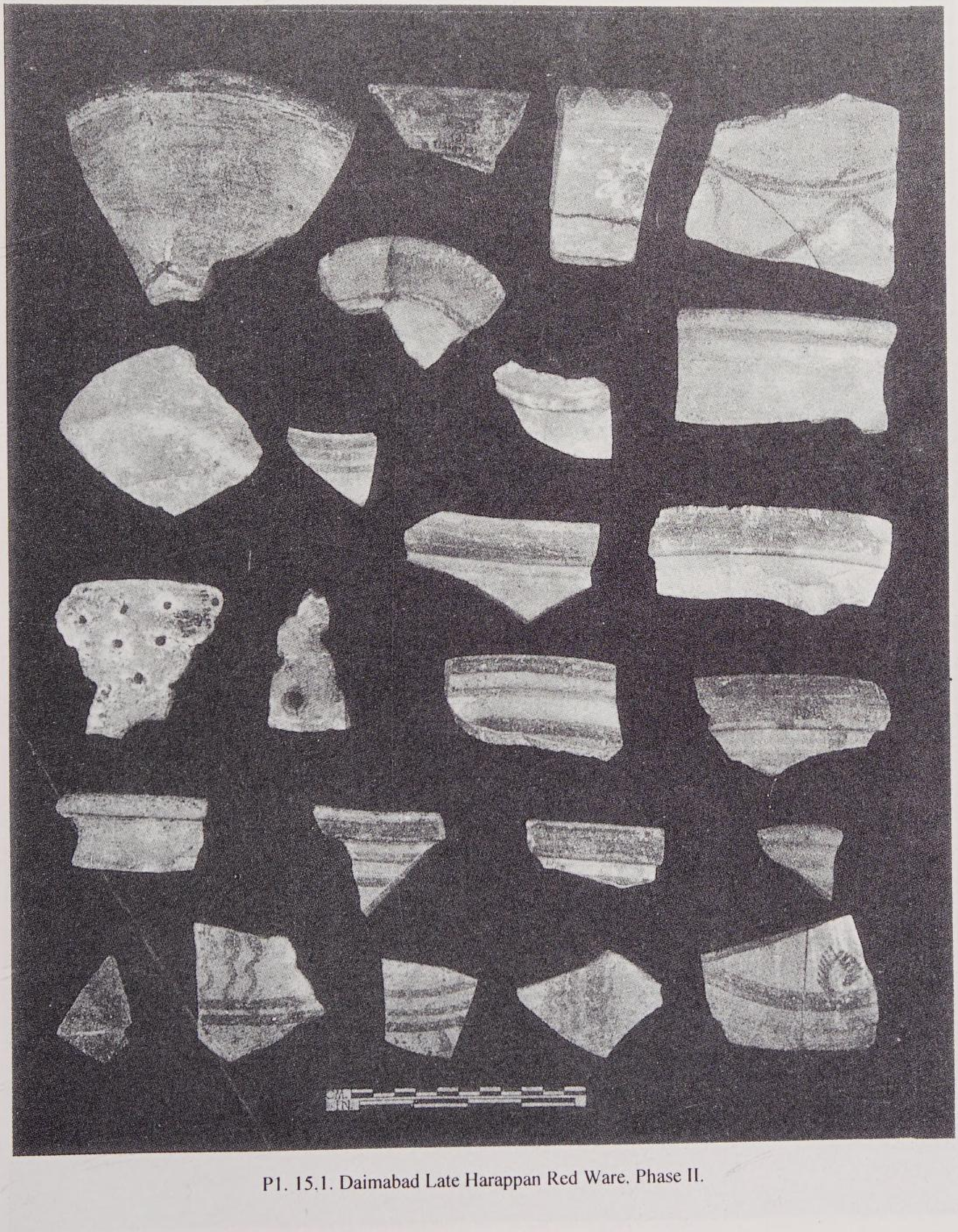
Pl. 13.10. Raja Sirkap: Terracotta cakes and missiles.

Pl. 14.1. The site of Zekda.

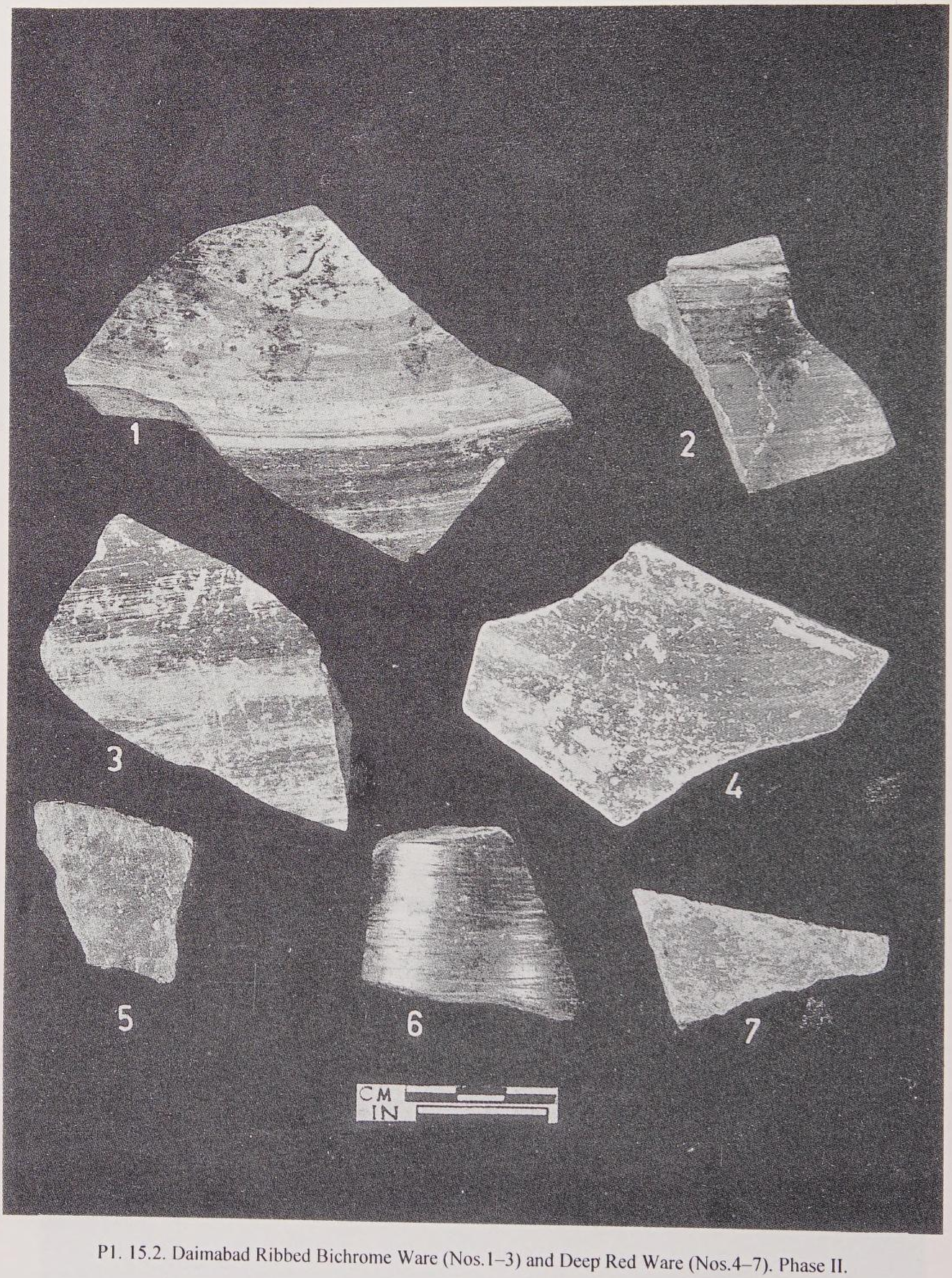
Pl. 14.2. The site of Kanewal.

Pl. 14.3. Graffiti on pottery from Kanewal.





Pl. 15.1. Daimabad Late Harappan Red Ware. Phase II.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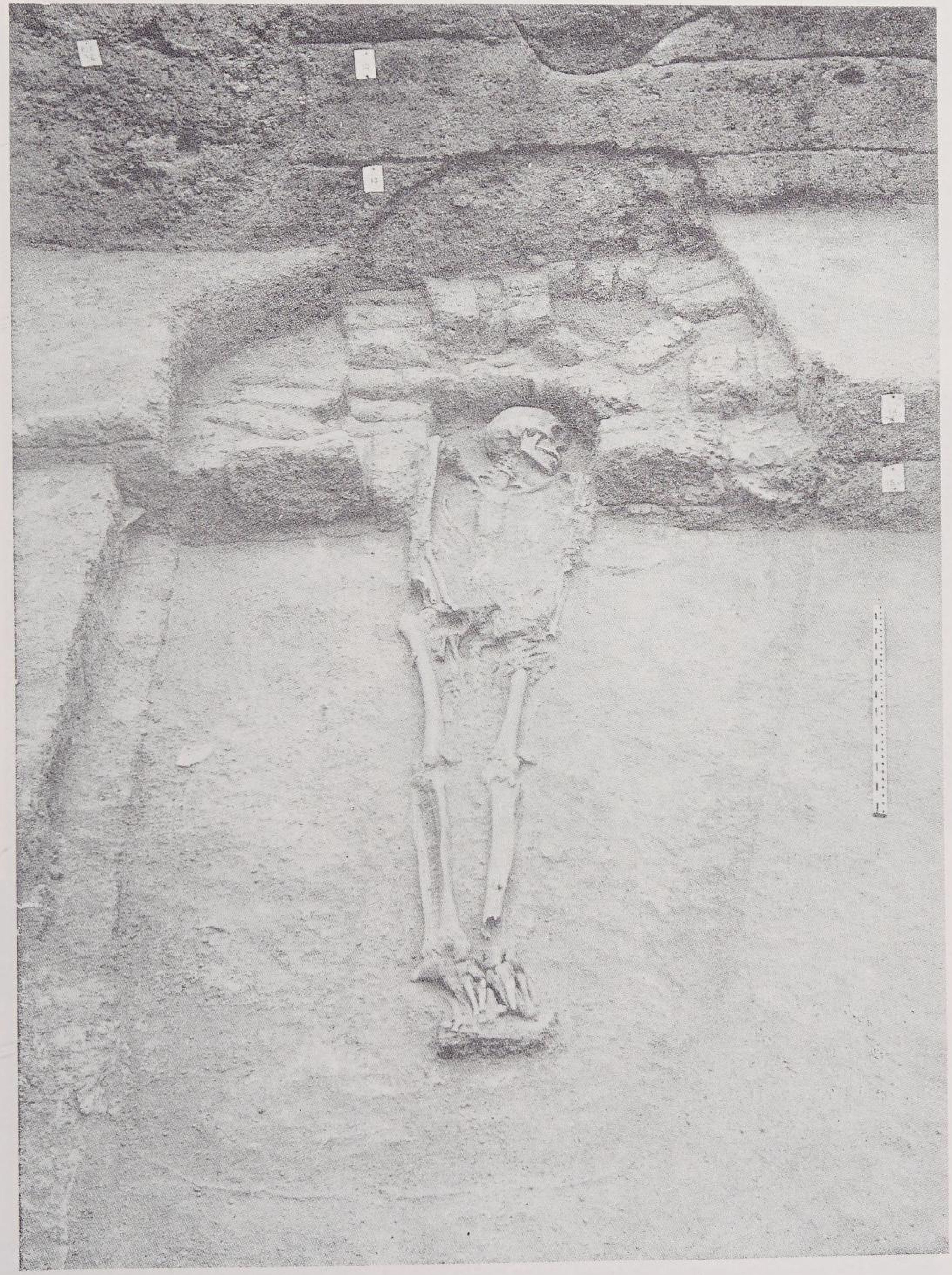
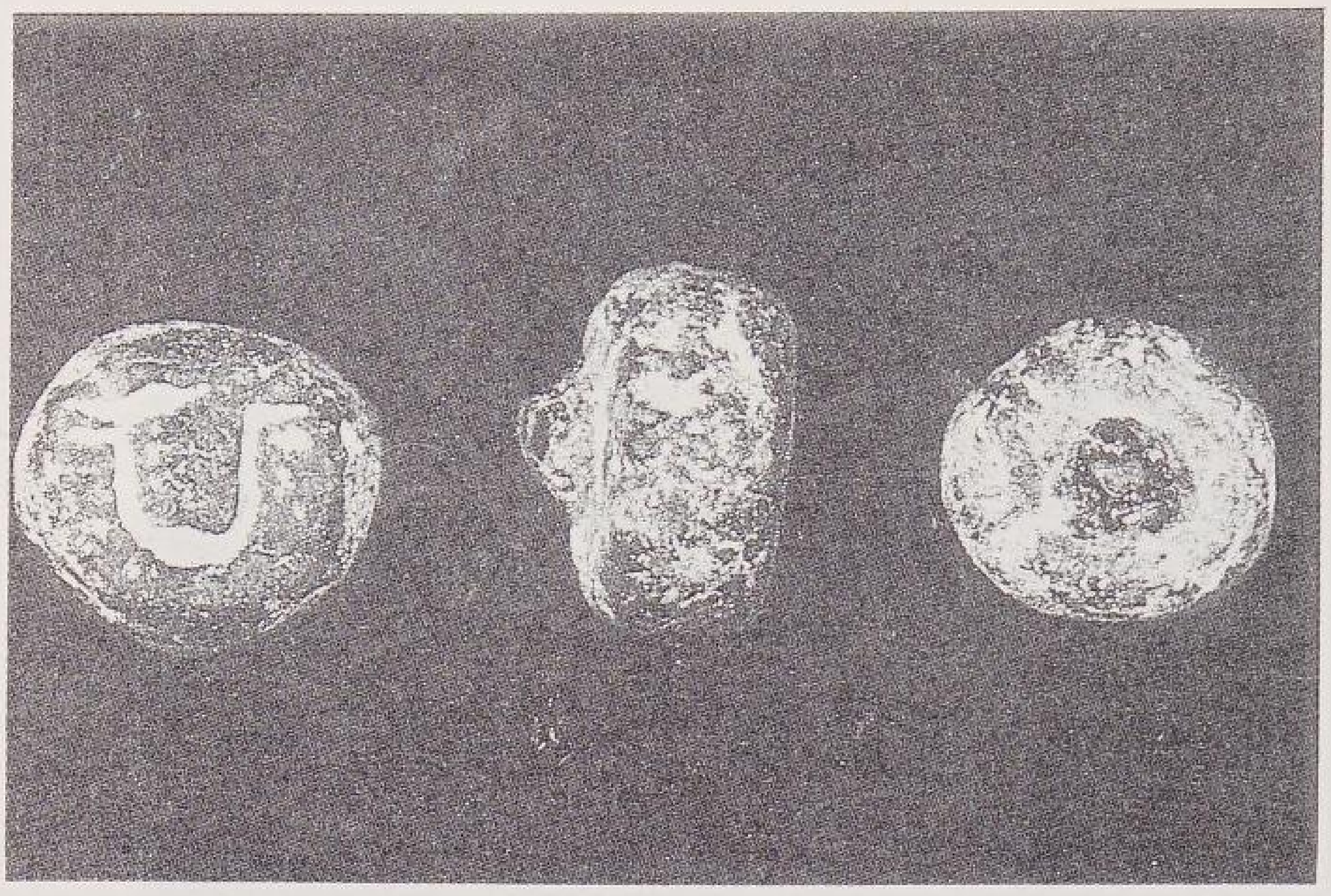
6
7
CM
IN

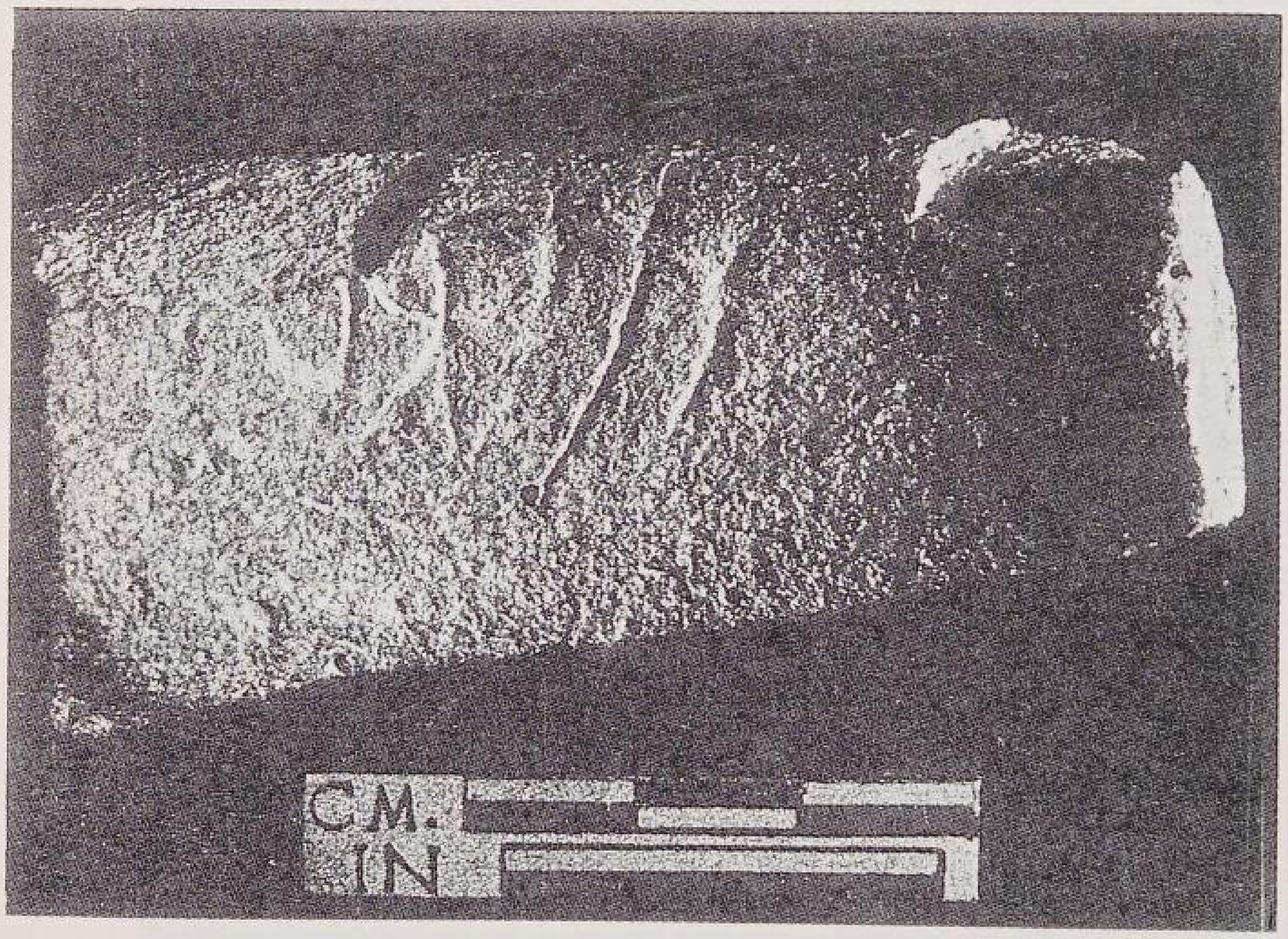
Pl. 15.2. Daimabad Ribbed Bichrome Ware (Nos.1–3) and Deep Red Ware (Nos.4–7). Phase II.



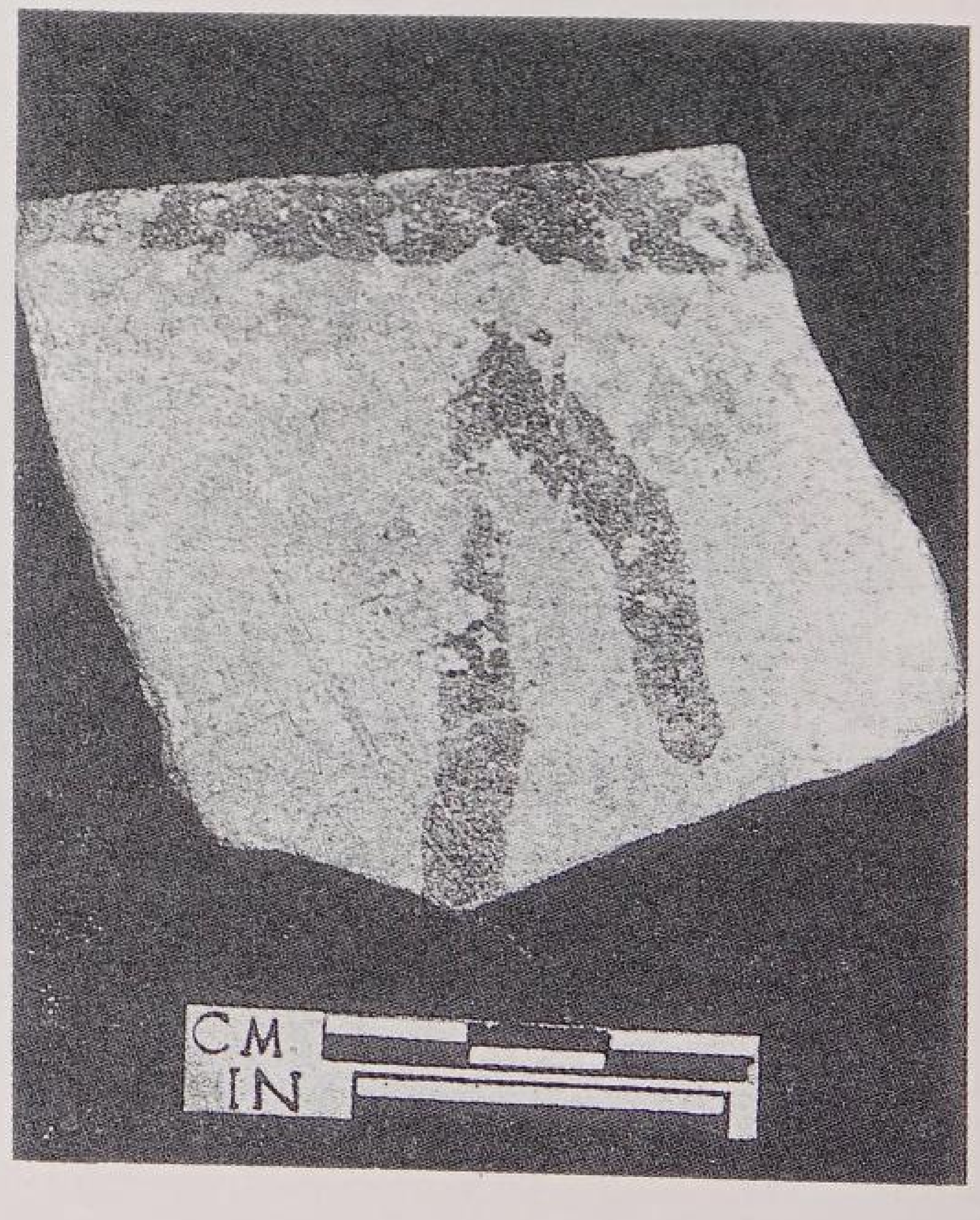
Pl. 15.3. Daimabad mud brick lined grave. Phase II



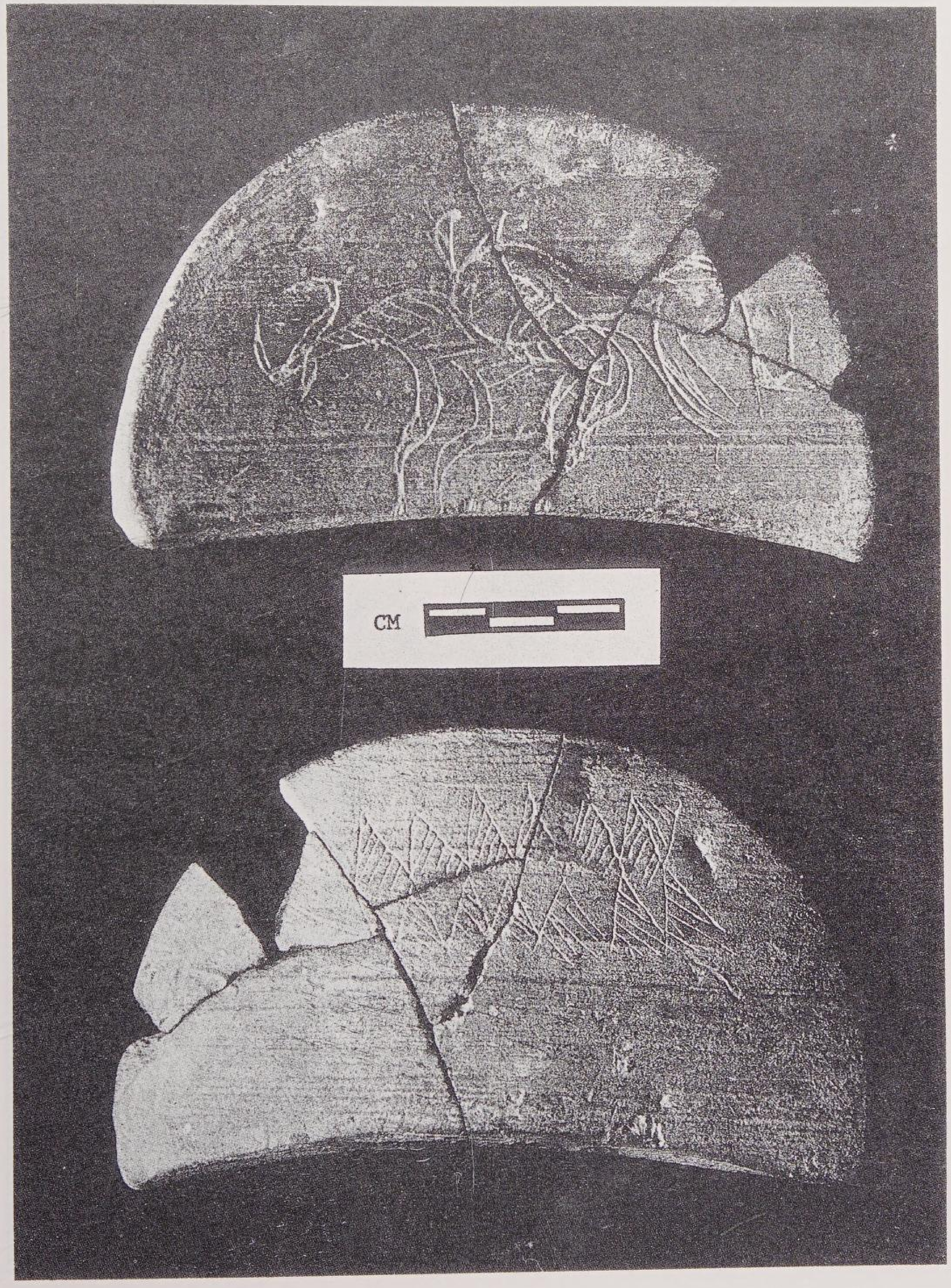
Pl. 15.4. Daimabad button-shaped seal with Indus script. Phase II.



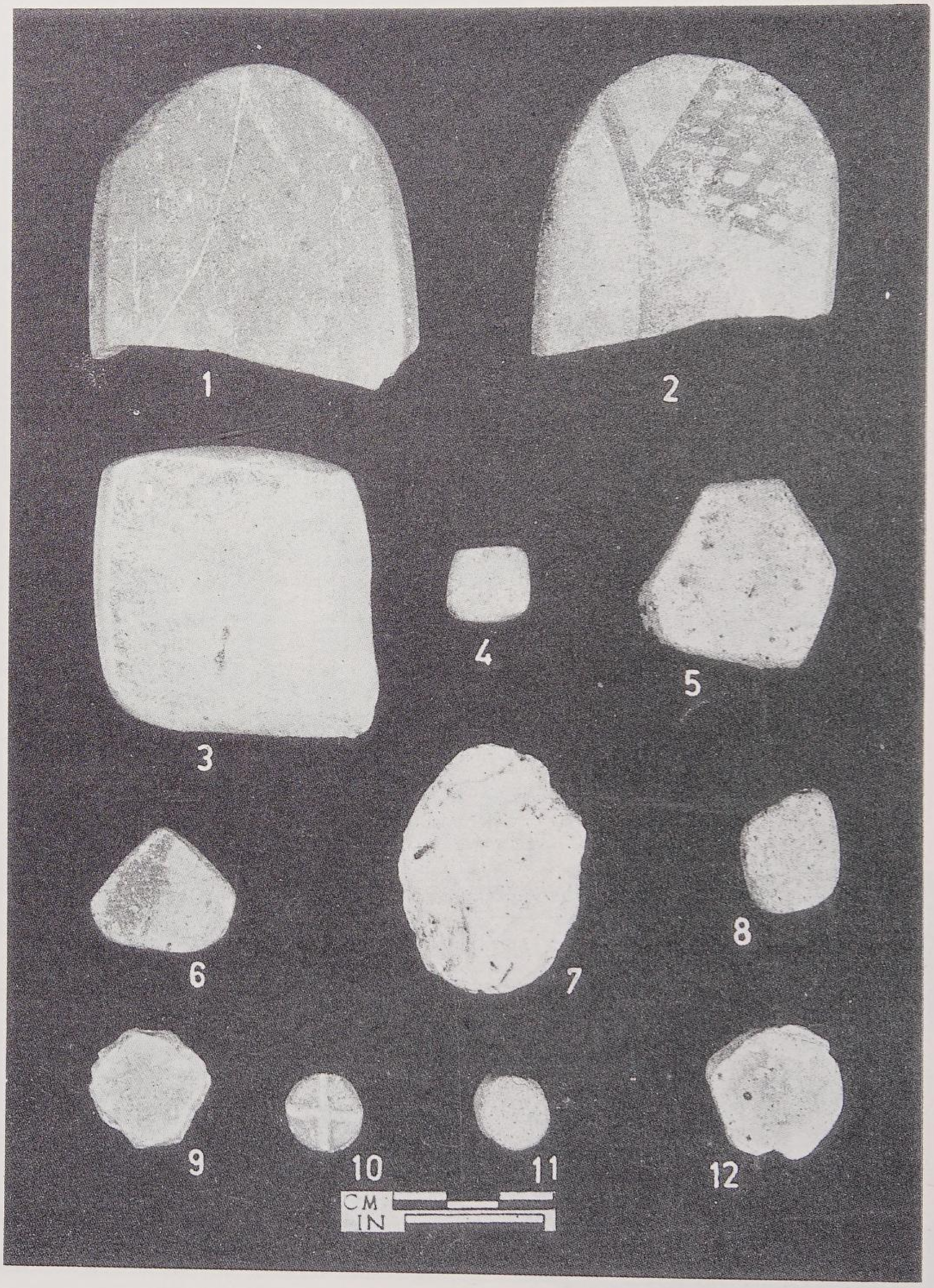
Pl. 15.5. Daimabad potsherd with inscribed Indus script. Phase II.



Pl. 15.6. Daimabad potsherd with painted Indus script. Phase II.



P1. 15.7. Daimabad. Engraved crescent-shaped potsherd showing obverse and reverse. Phase II.


1
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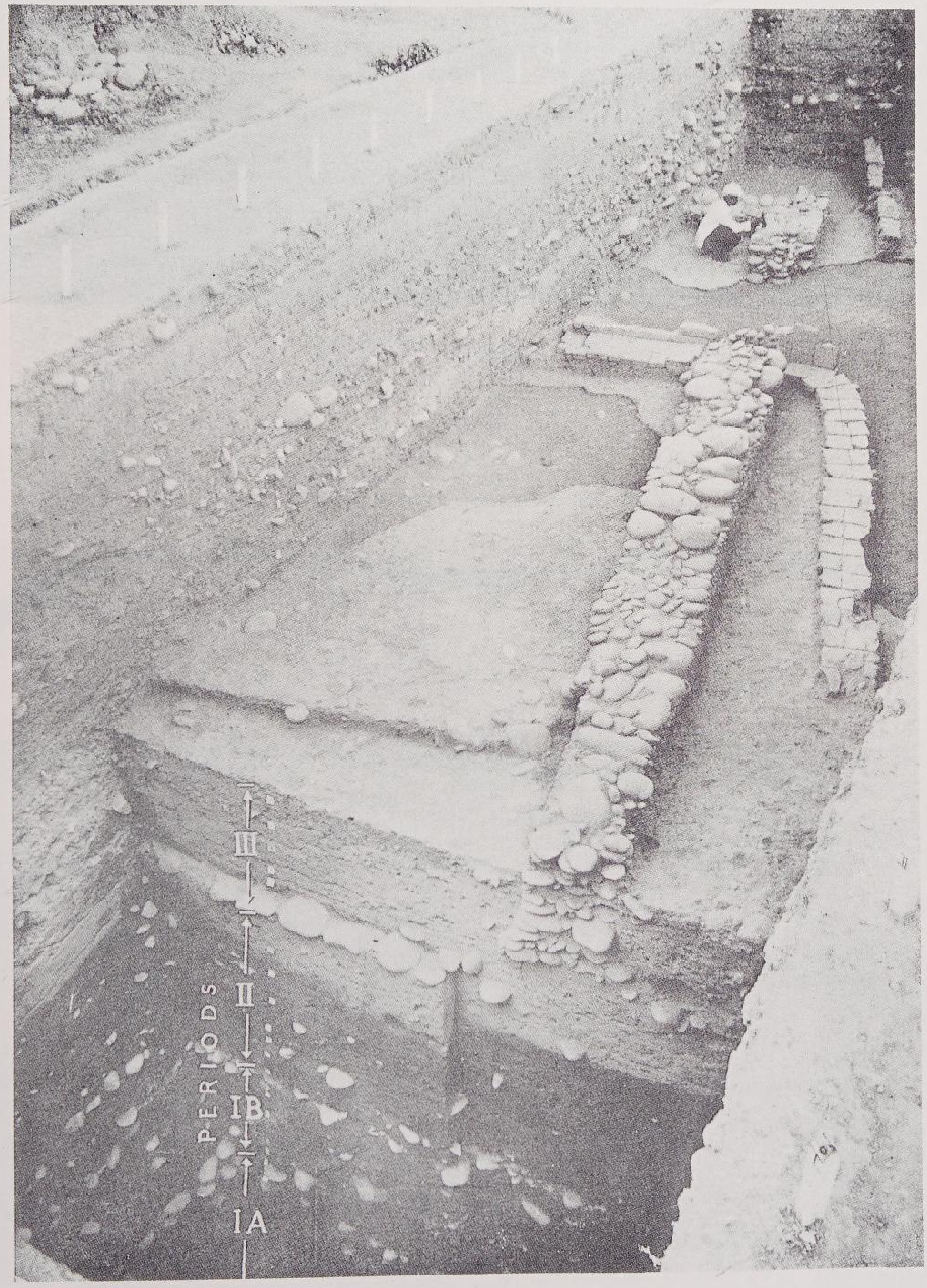
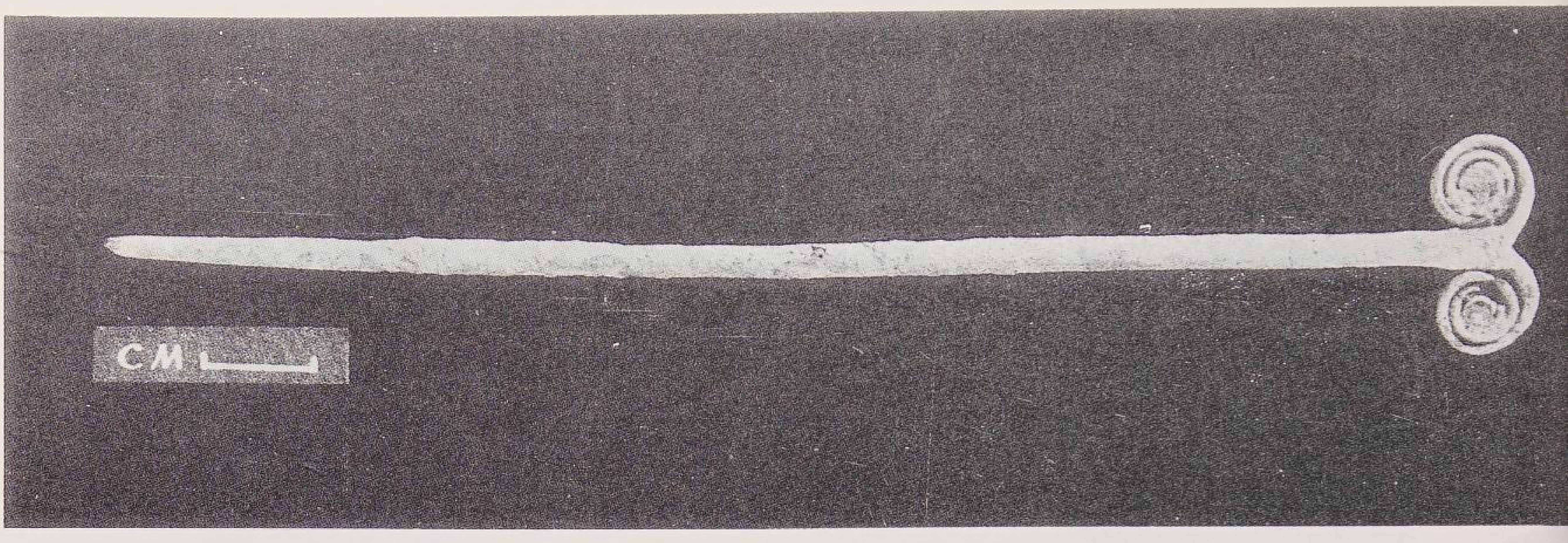
CM
IN

Pl. 15.8. Daimabad. Terracotta cake (No.7) and other pottery objects. Phase II.

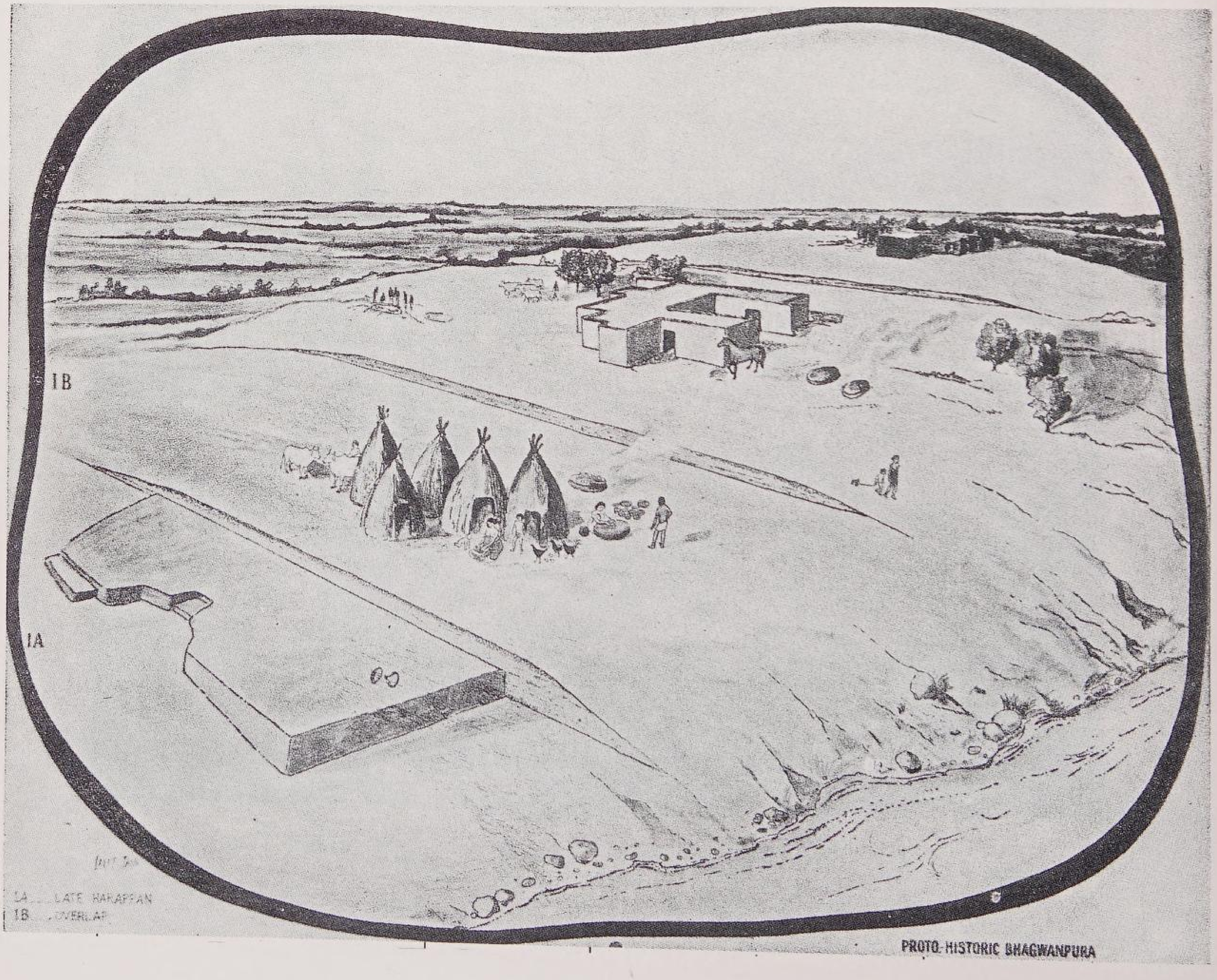

III
II
PERIODS
IB
IA

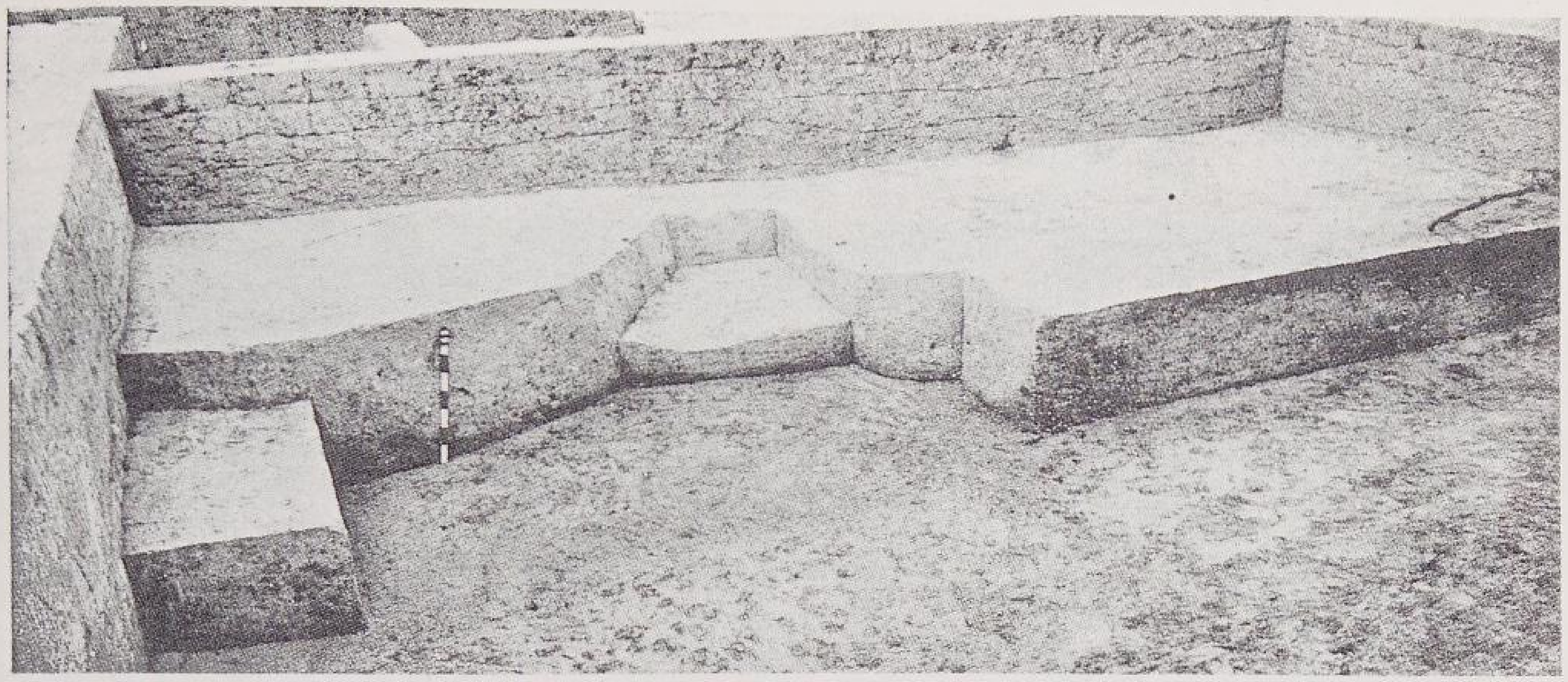
Pl. 16.1. Manda. Stratigraphy.



P1. 16.2. Manda. Double spiral-headed pin.

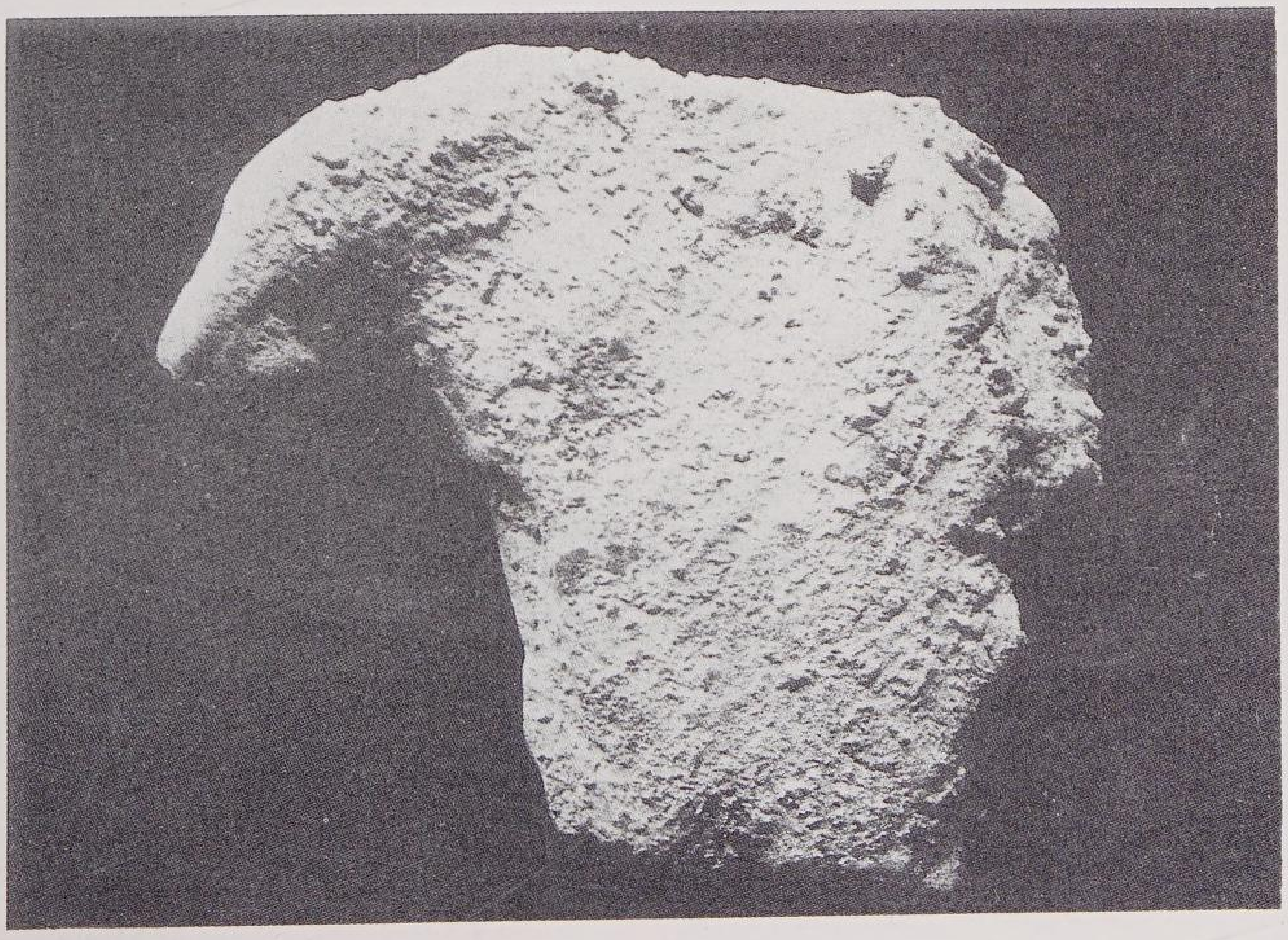
P1. 16.3. Bhagwanpura. Protohistoric plan.

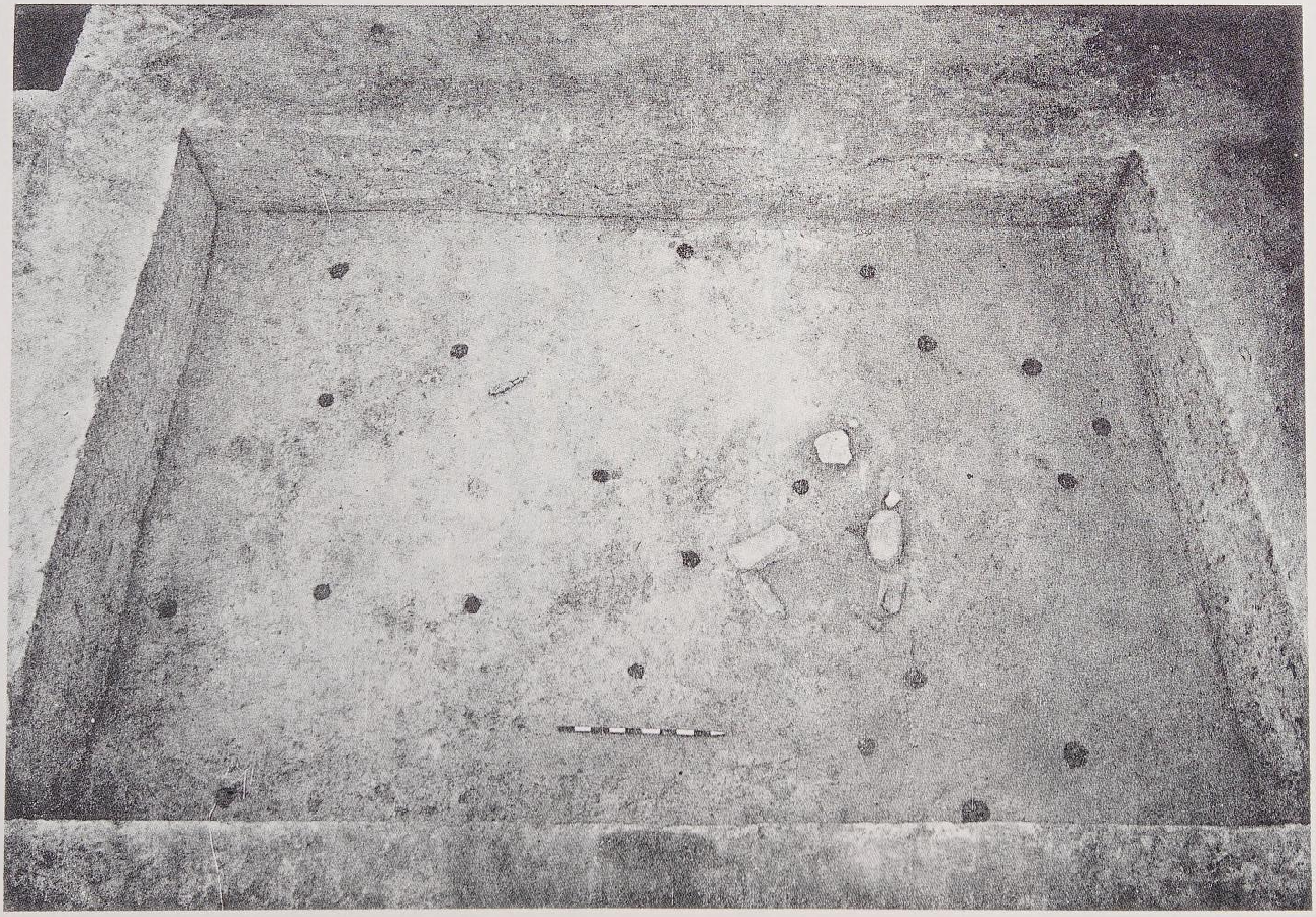

IB
IA
IA.... LATE HARAPPAN
IB.... OVERLAP
PROTO-HISTORIC BHAGWANPURA



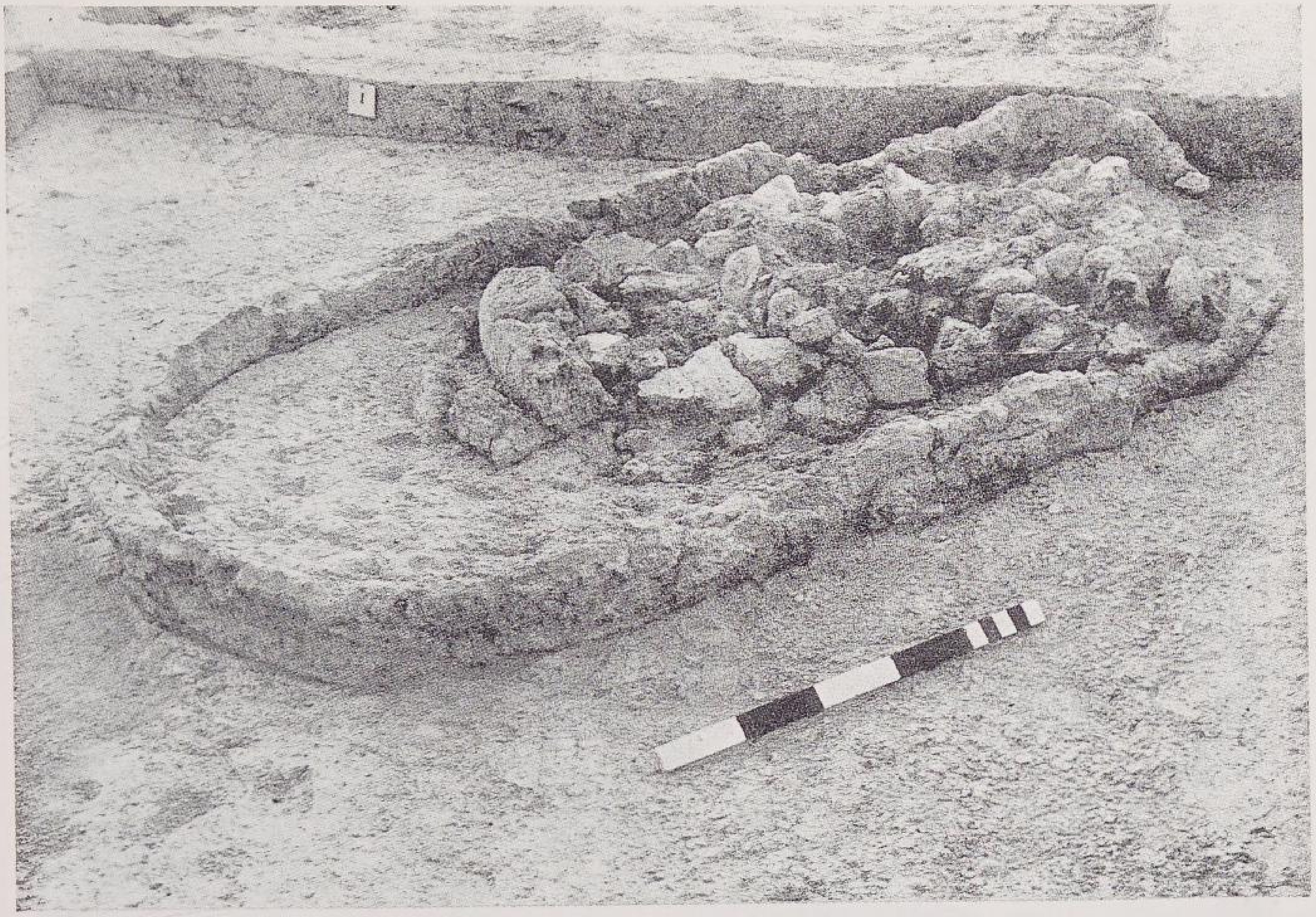
Pl. 16.4. Bhagwanpura. Platform in Subperiod IA.

Pl. 16.5. Bhagwanpura. Figurine.



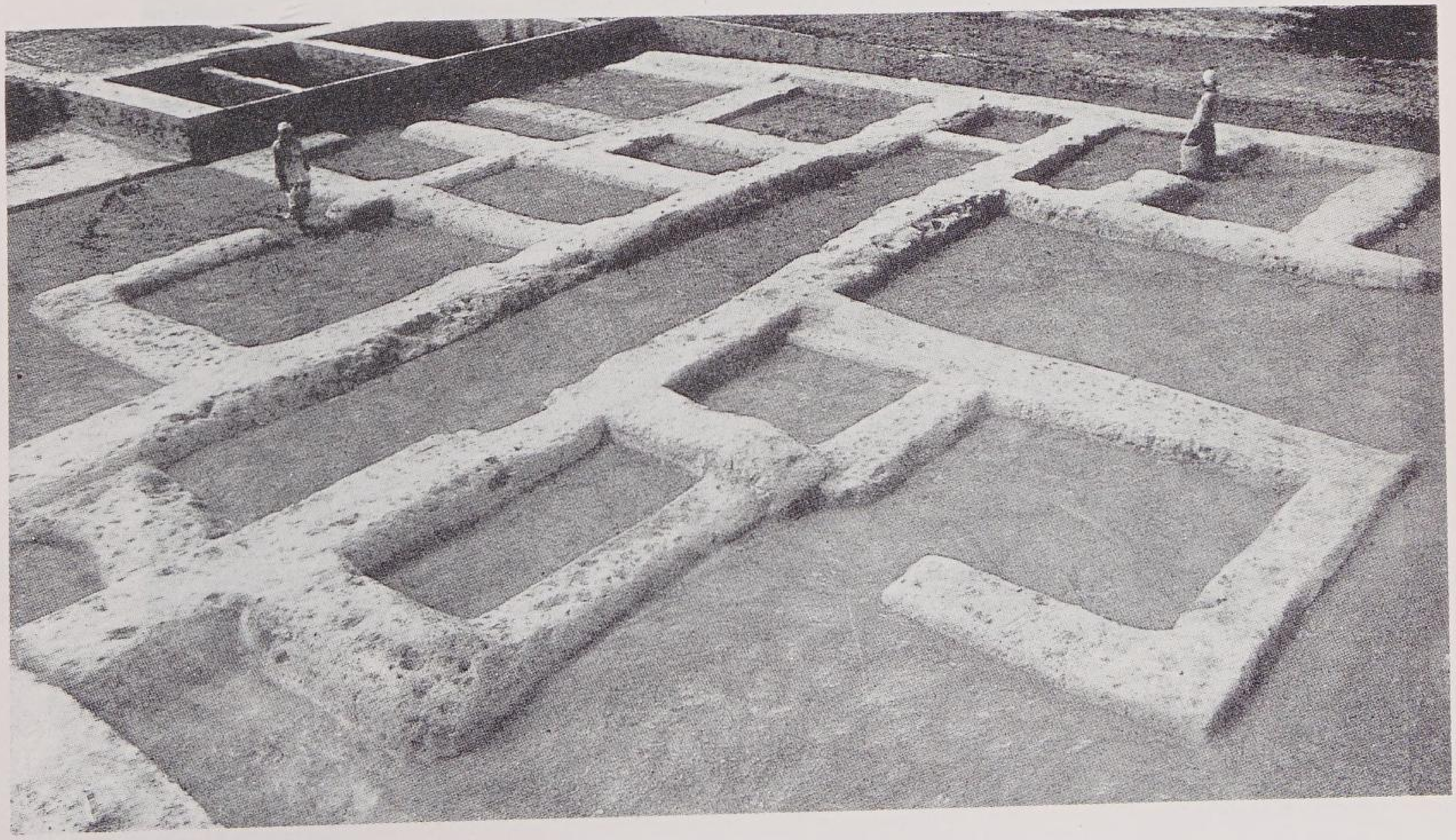


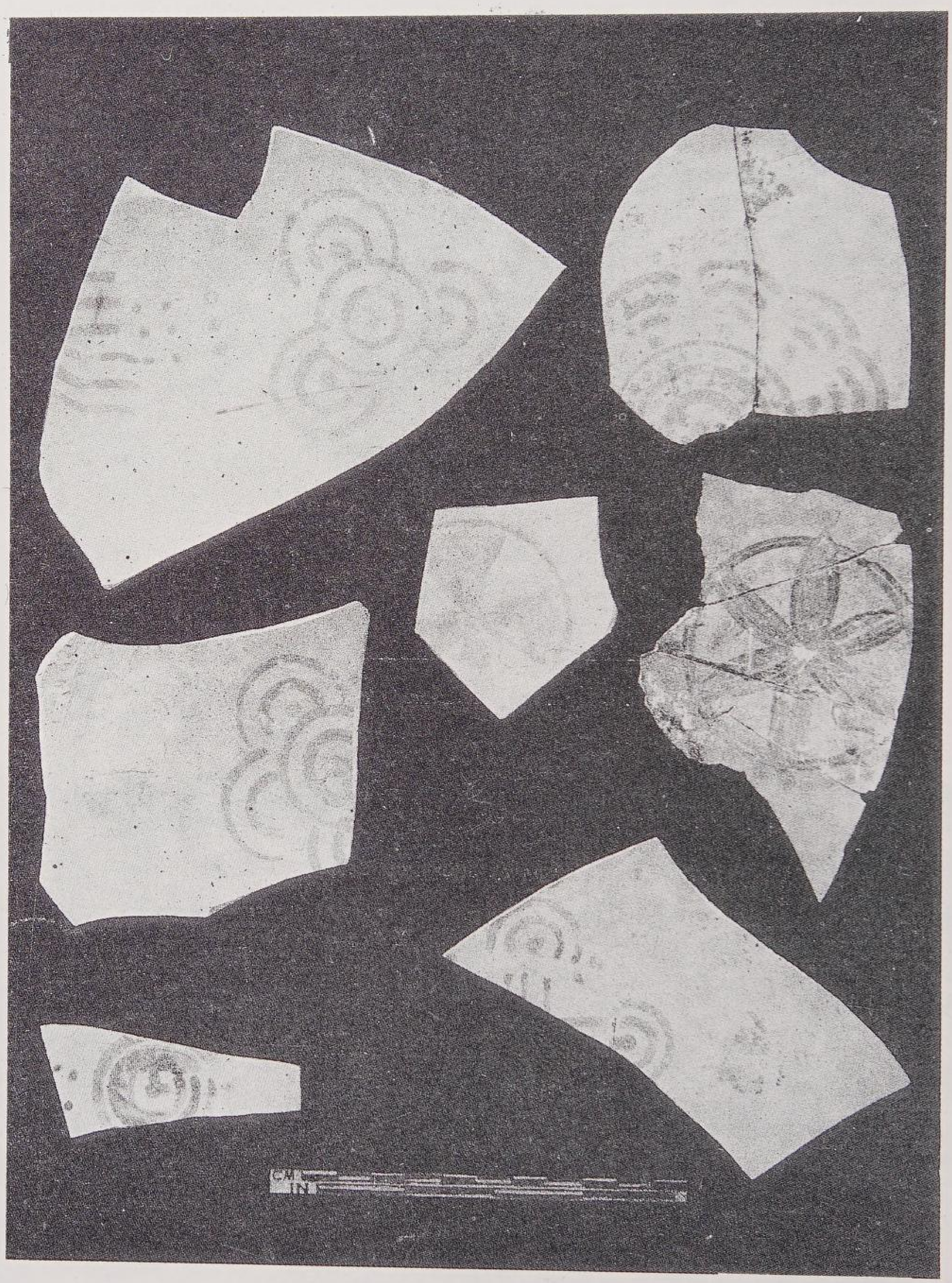
Pl. 16.6. Bhagwanpura. Circular hut in Subperiod IB.



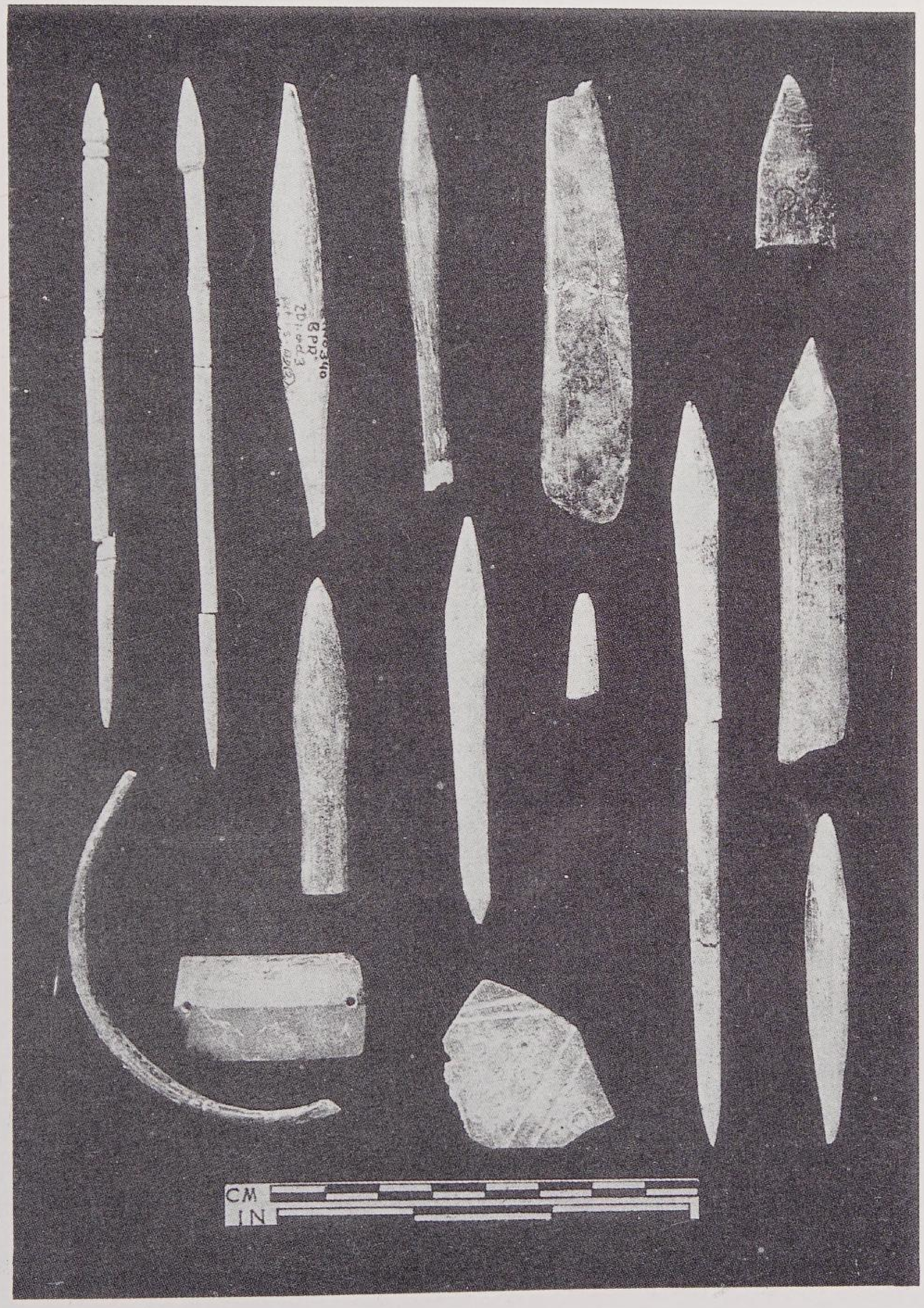
Pl. 16.7. Bhagwanpura. Structure in Subperiod IB.

Pl. 16.8. Bhagwanpura. Structure in Subperiod IB.

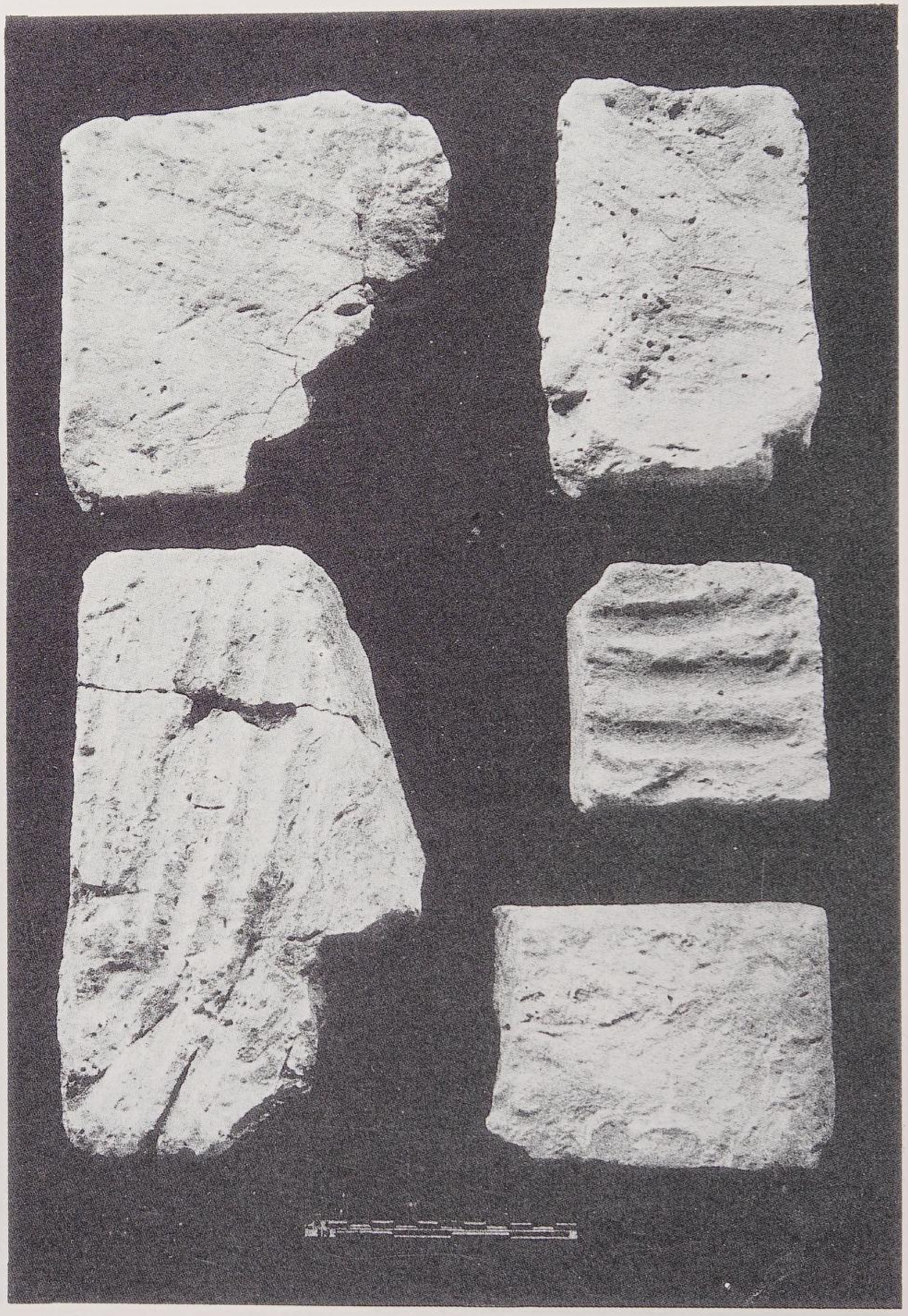




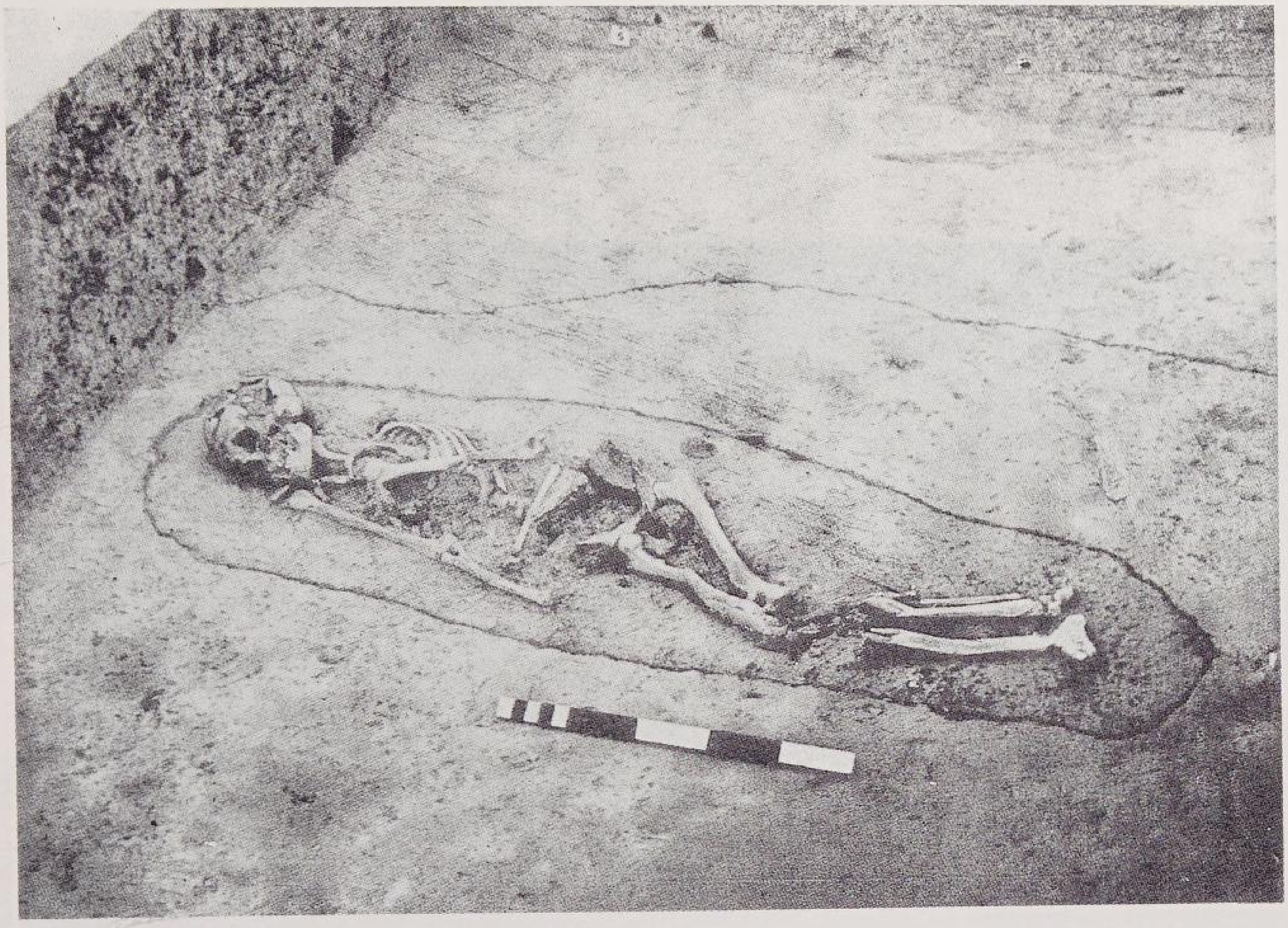
Pl. 16.9. Bhagwanpura. PGW in Subperiod IB.



Pl. 16.10. Bhagwanpura. Small finds.

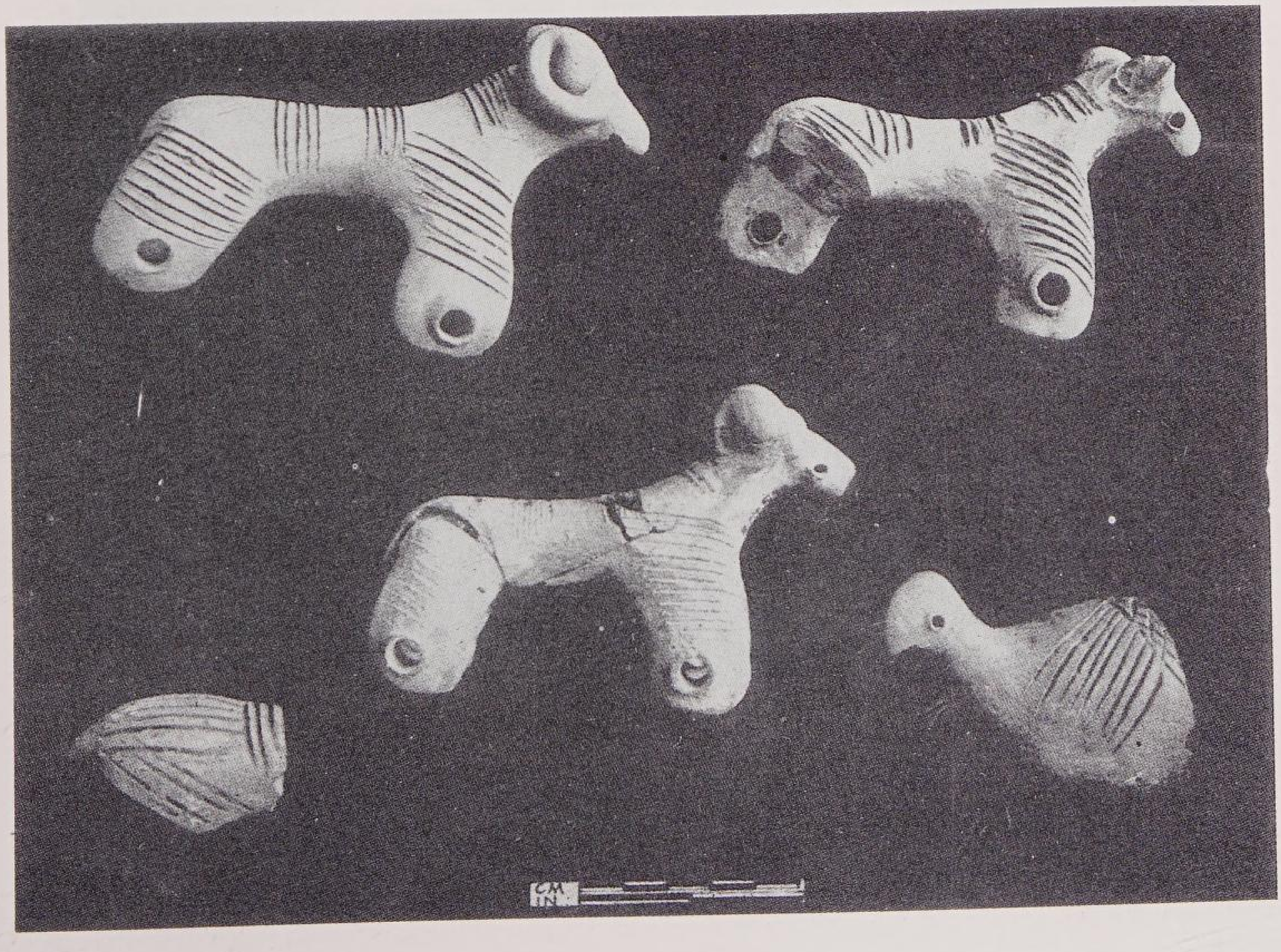


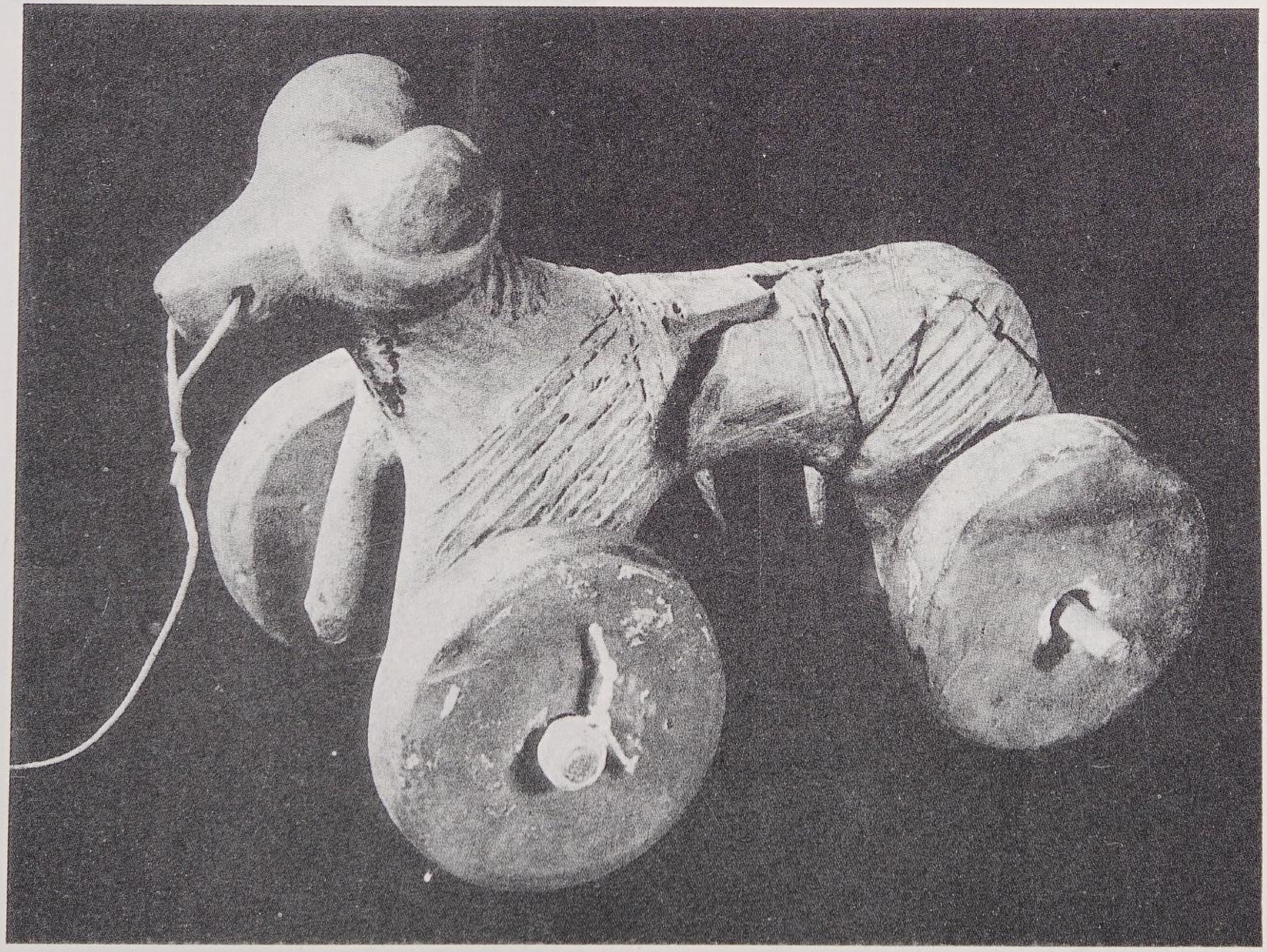
Pl. 16.11. Bhagwanpura. Baked bricks of Subperiod IB.



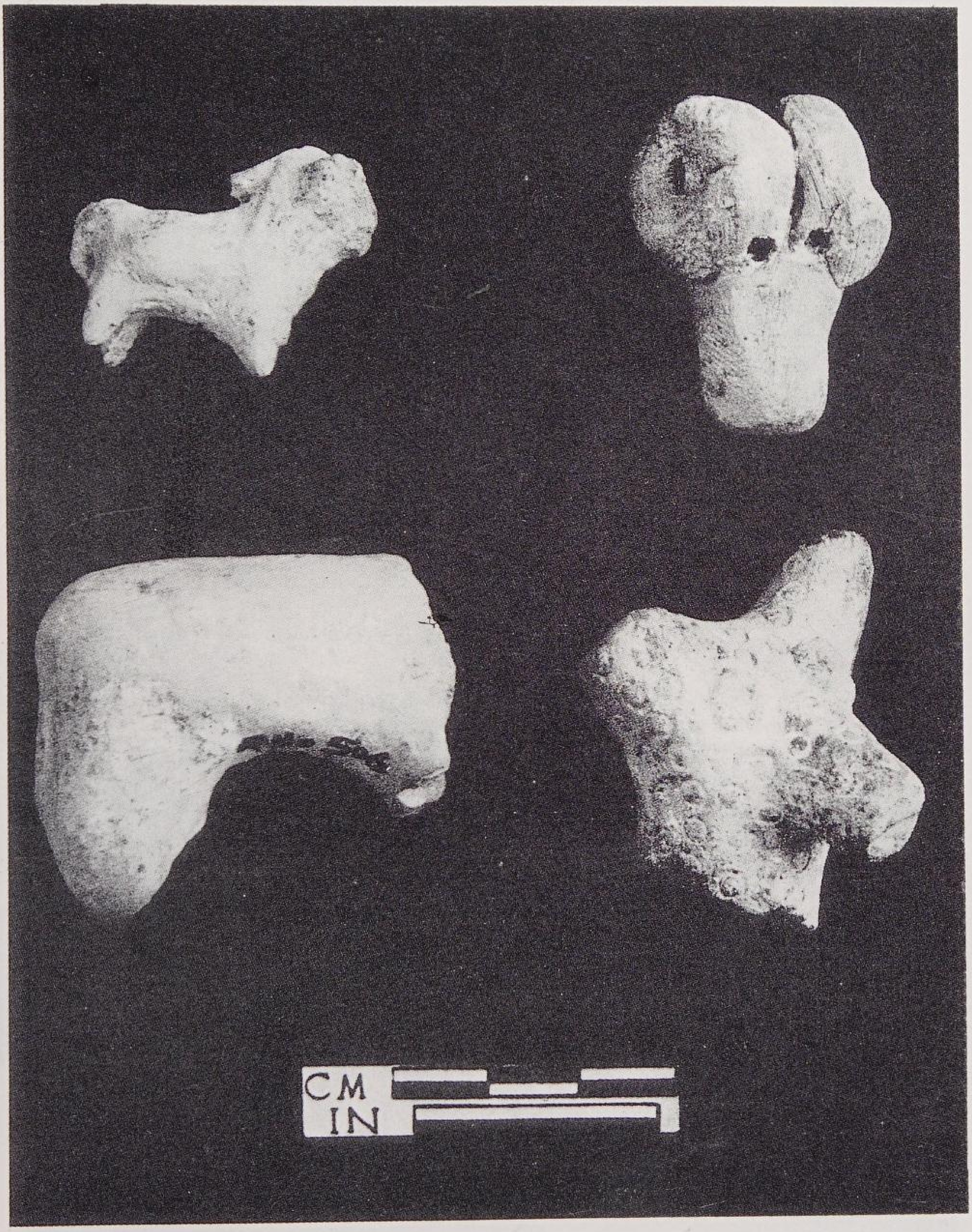
P1. 16.12. Bhagwanpura. Burial of an adult.

P1. 16.13. Bhagwanpura. Incised ram figurines.

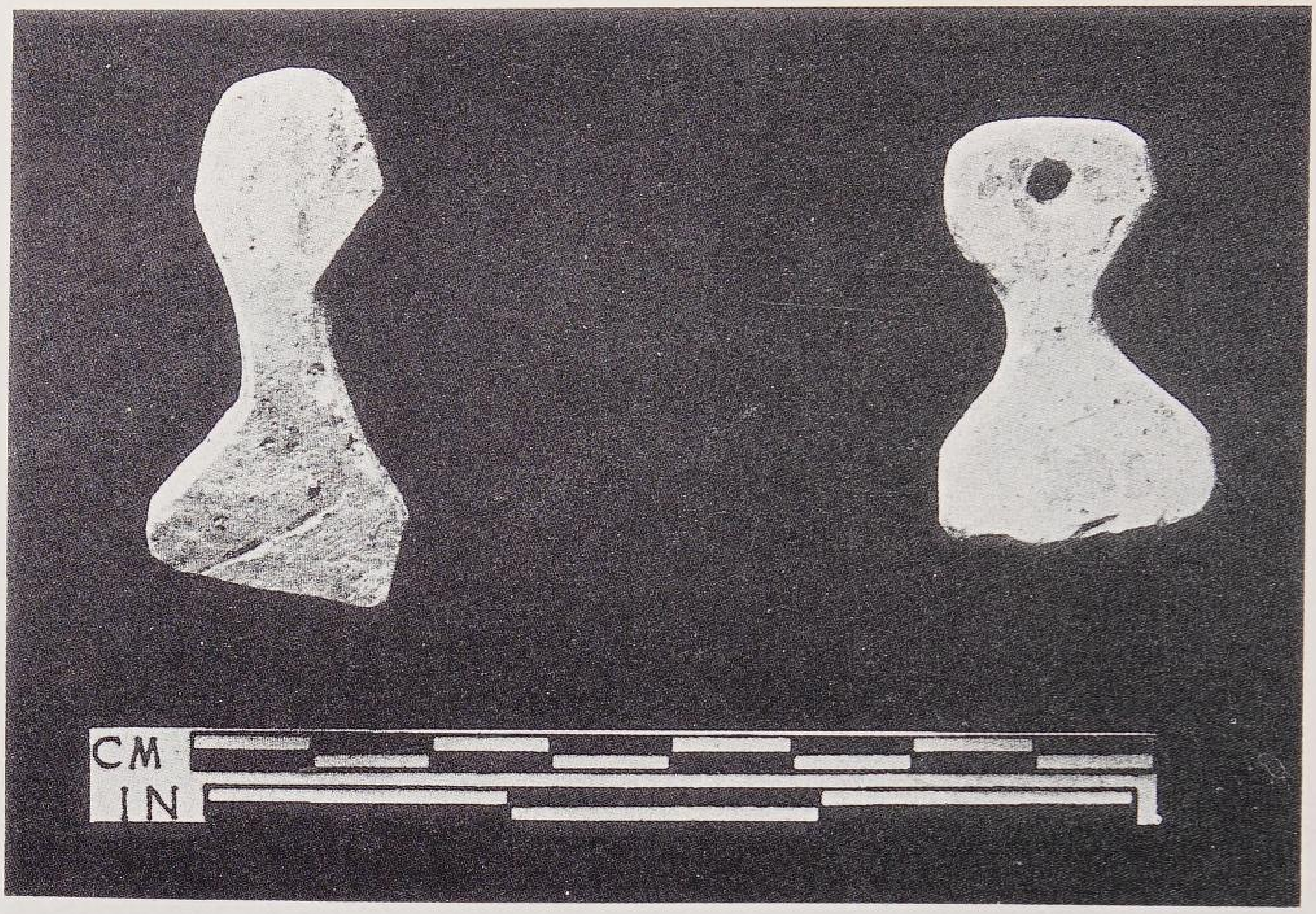




Pl. 16.14. Bhagwanpura. Incised ram figurine on wheels.

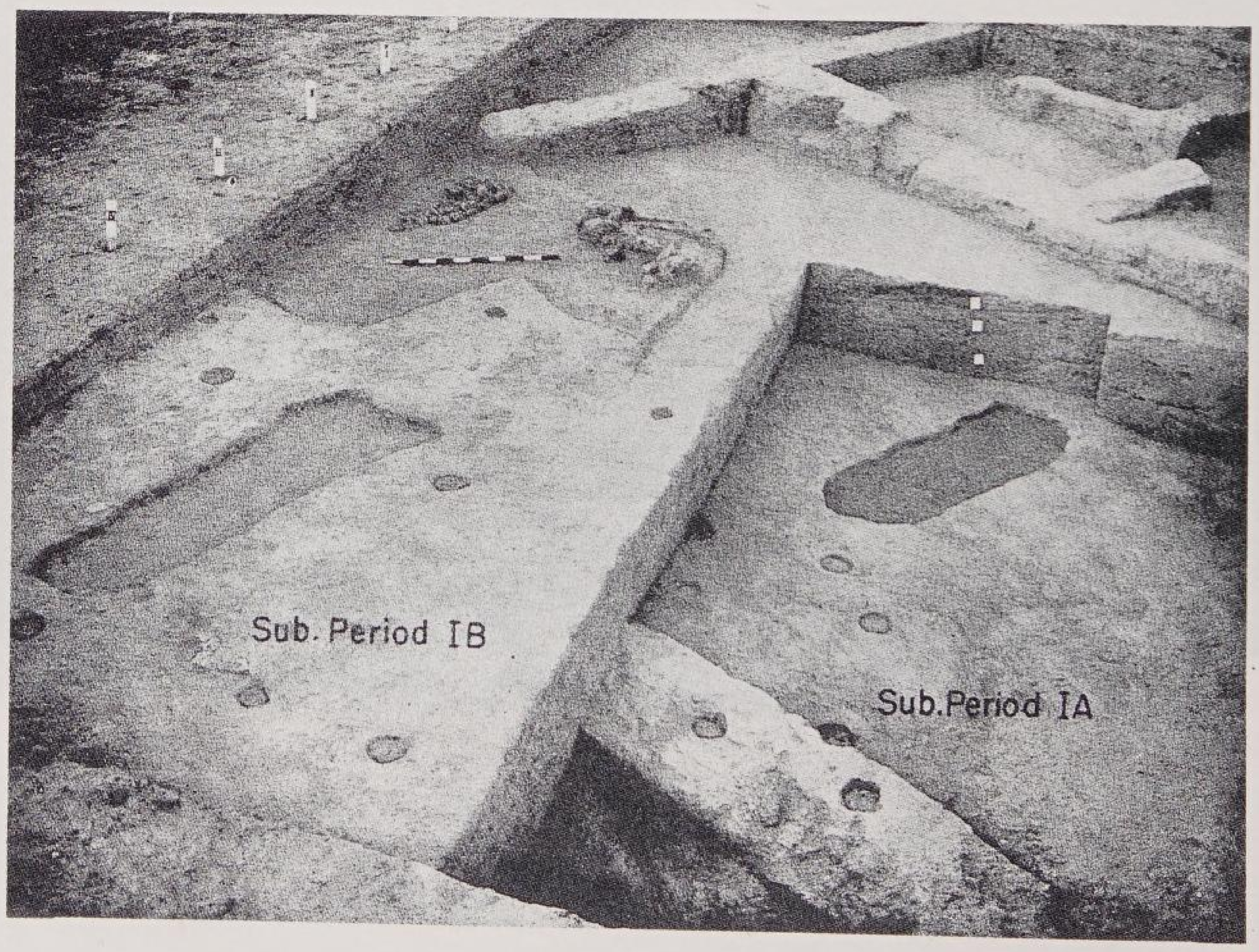


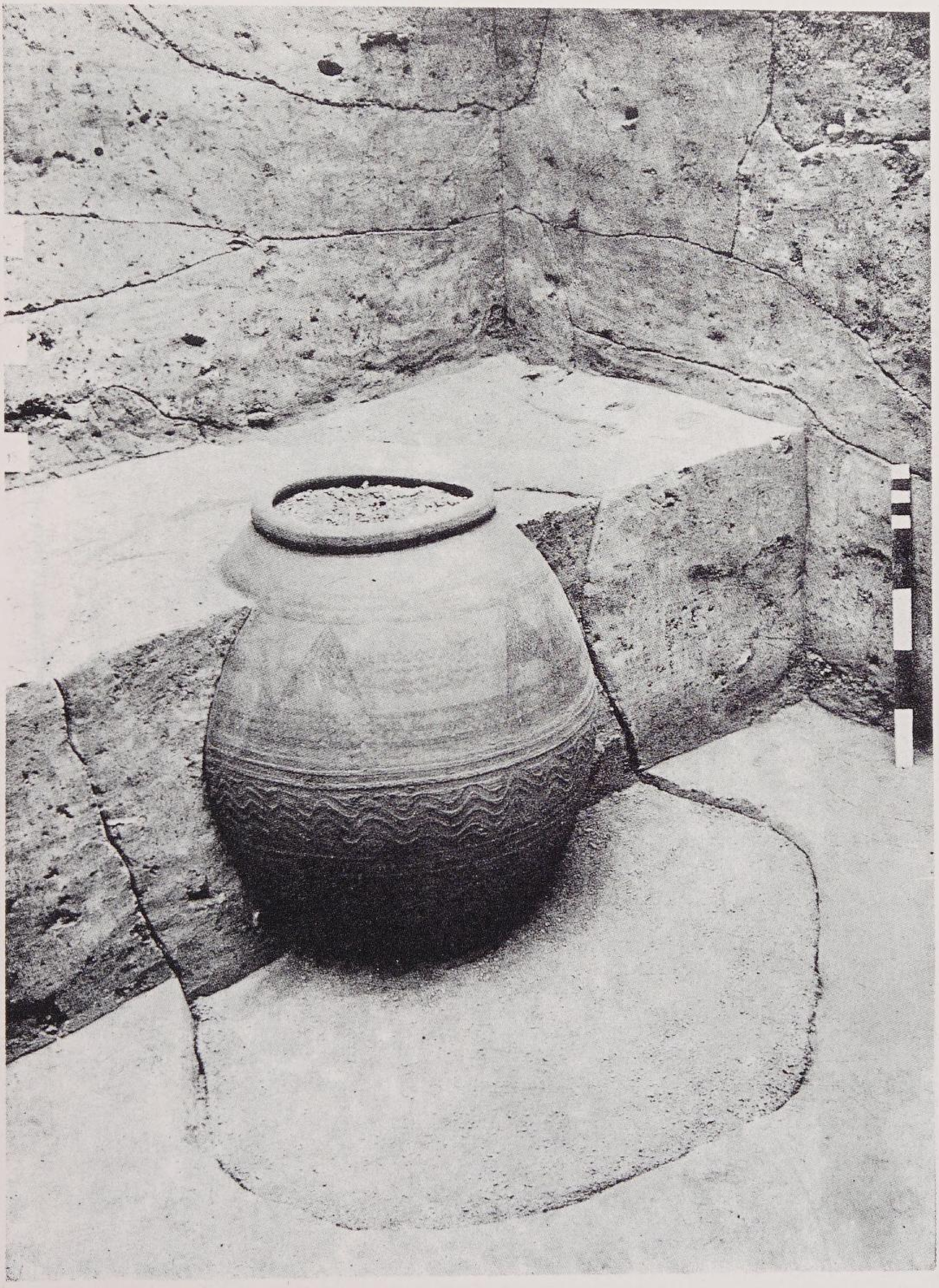
Pl. 16.15. Bhagwanpura. Ram figurines.



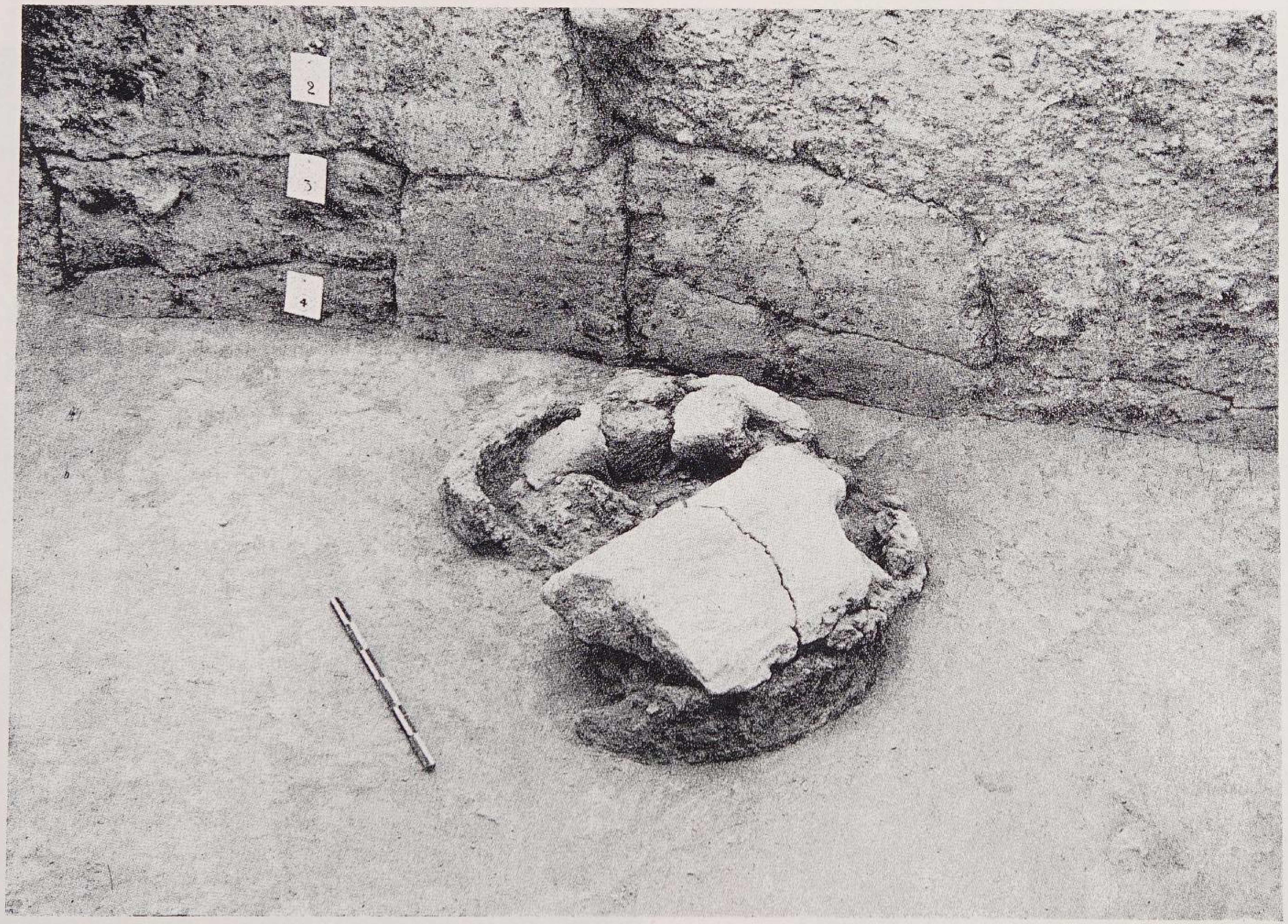
Pl. 16.16. Bhagwanpura. Mother goddess figurines.

Pl. 16.17. Dadheri. Stratigraphy with indications of huts.

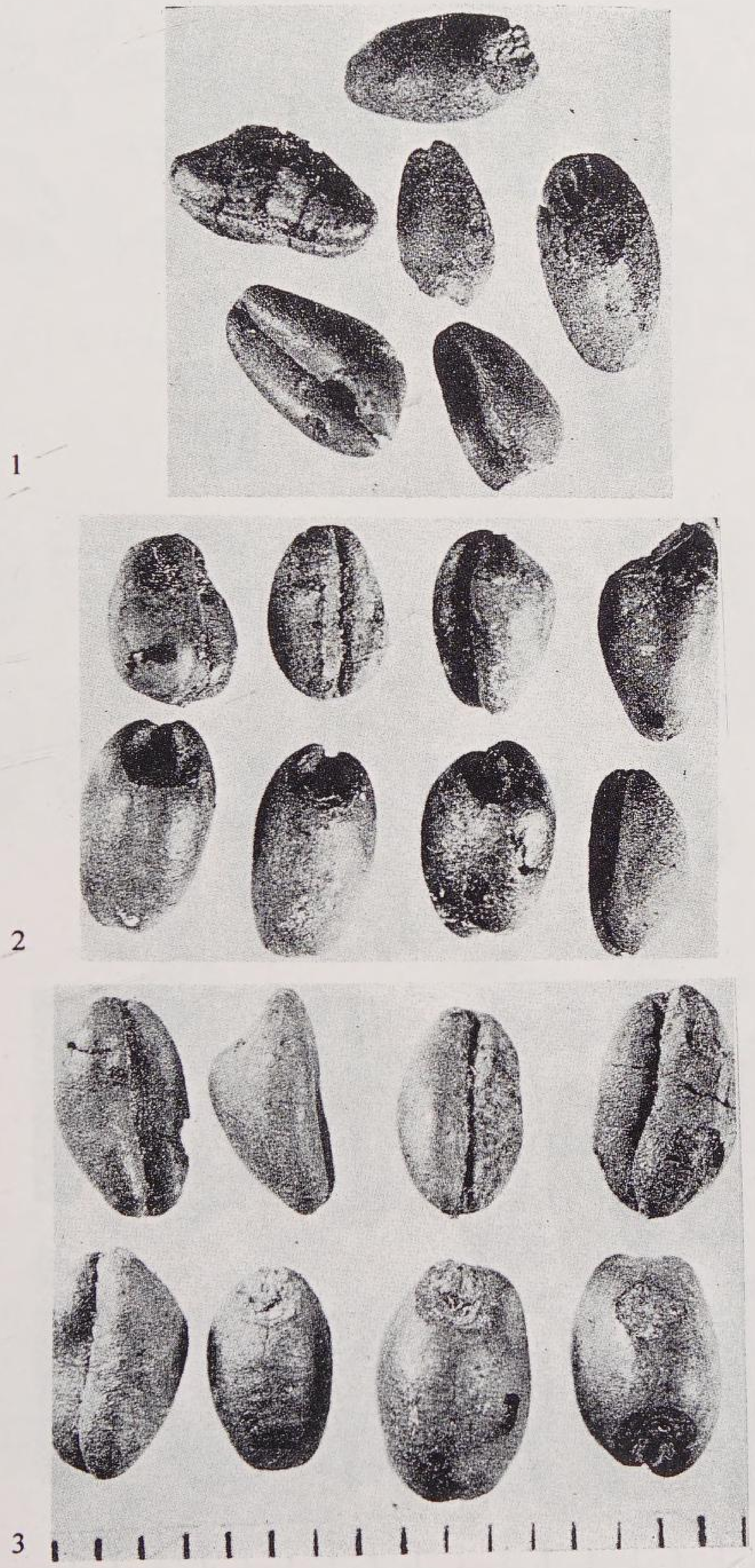

Sub. Period IB
Sub.Period IA



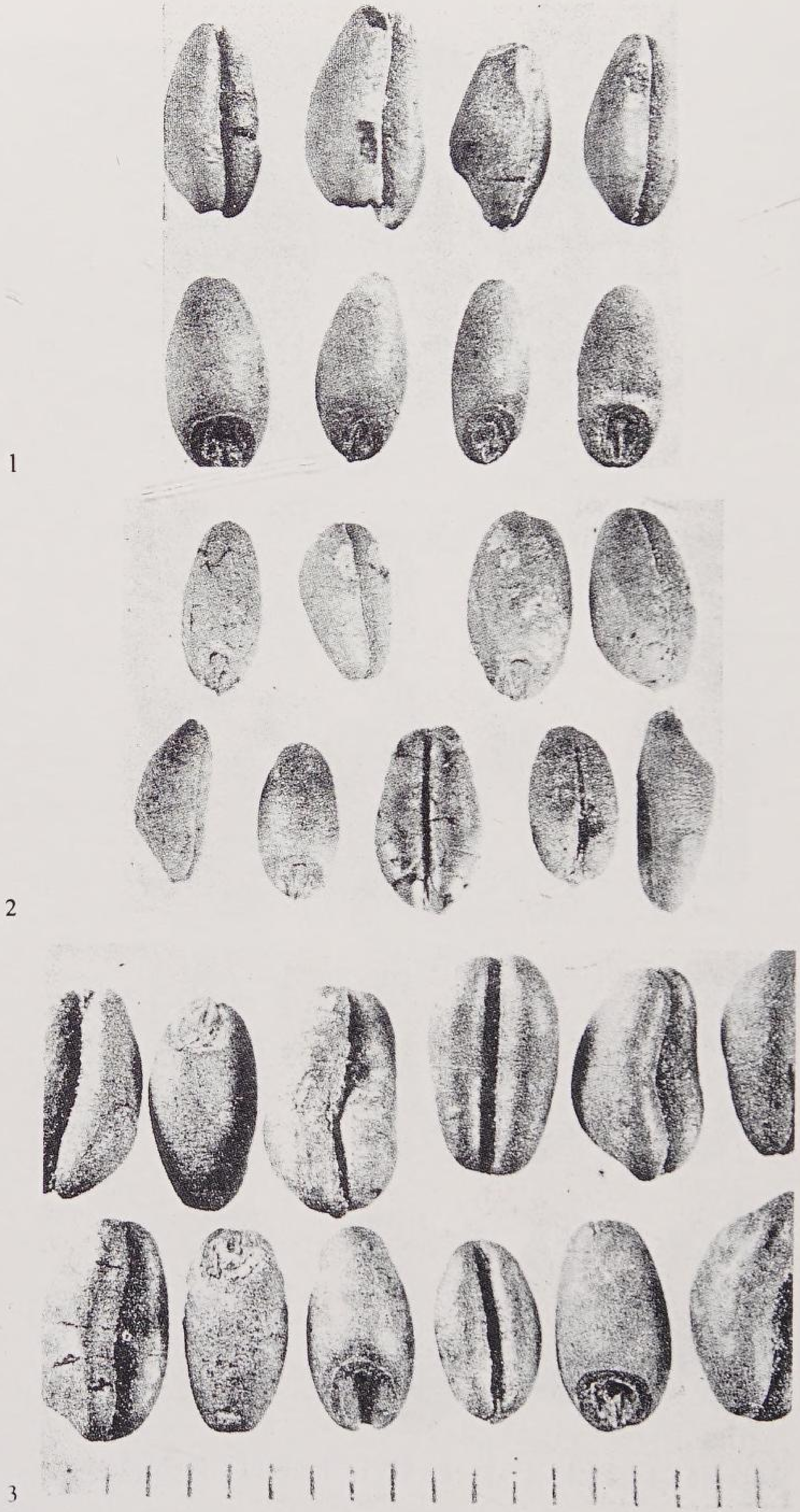
P1. 16.18. Dadheri. Painted and incised pot.



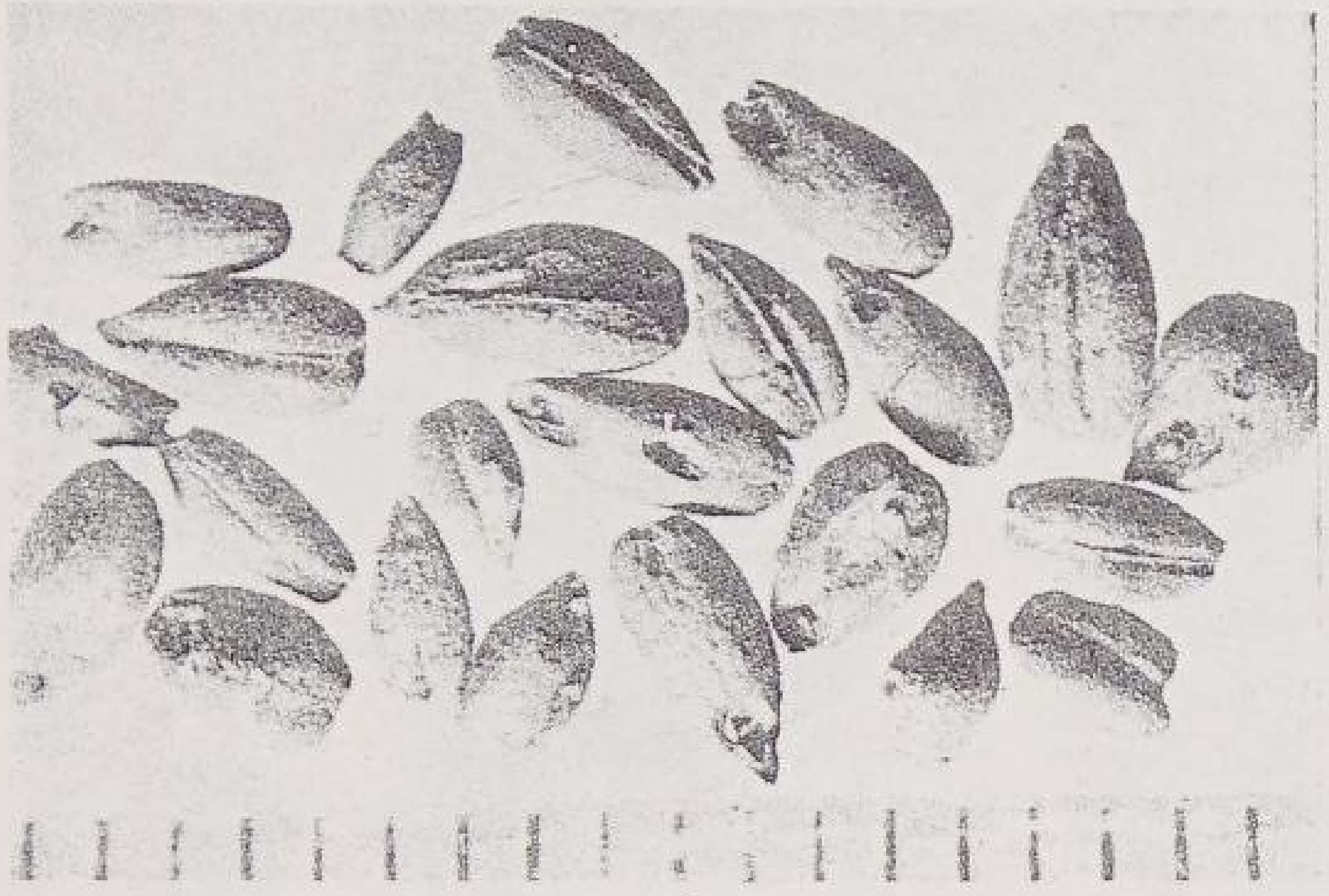
Pl. 16.19. Dadheri. Oval structure of burnt earth.



Pl. 18.1. *Trriticum sphaerococcum,* No. 1. From Mohenjodaro. Nos. 2, 3. From Chanhudaro.



Pl. 18.2. *Trriticum compactum, vulgare* group. Nos. 1, 2. From Mohenjodaro.
No. 3. From Chanhudaro.



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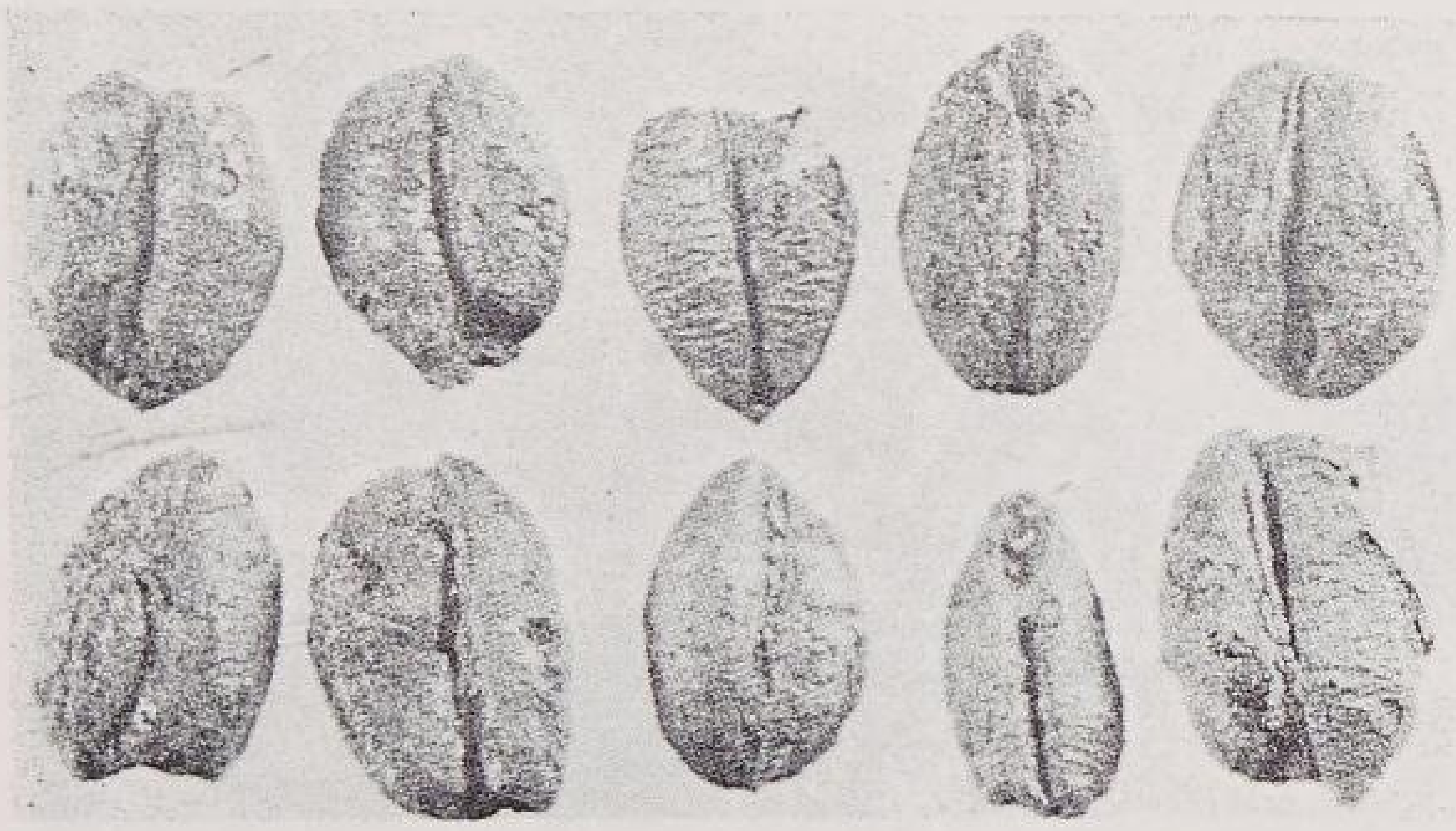

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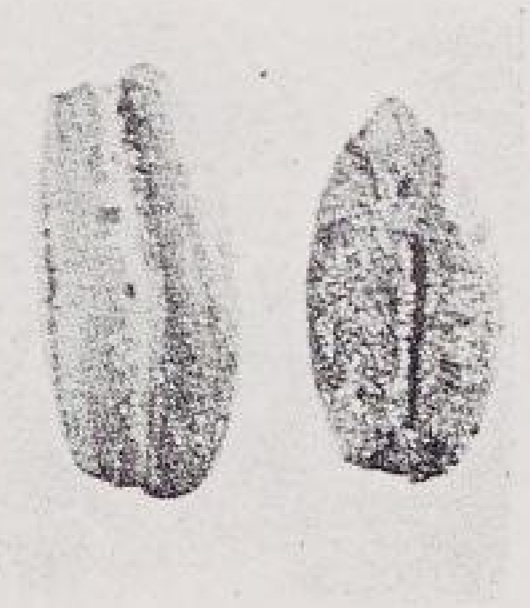

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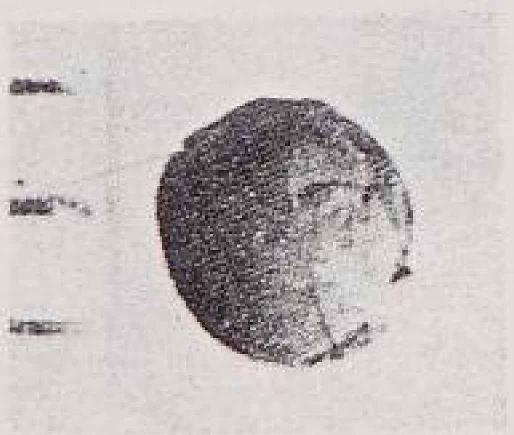

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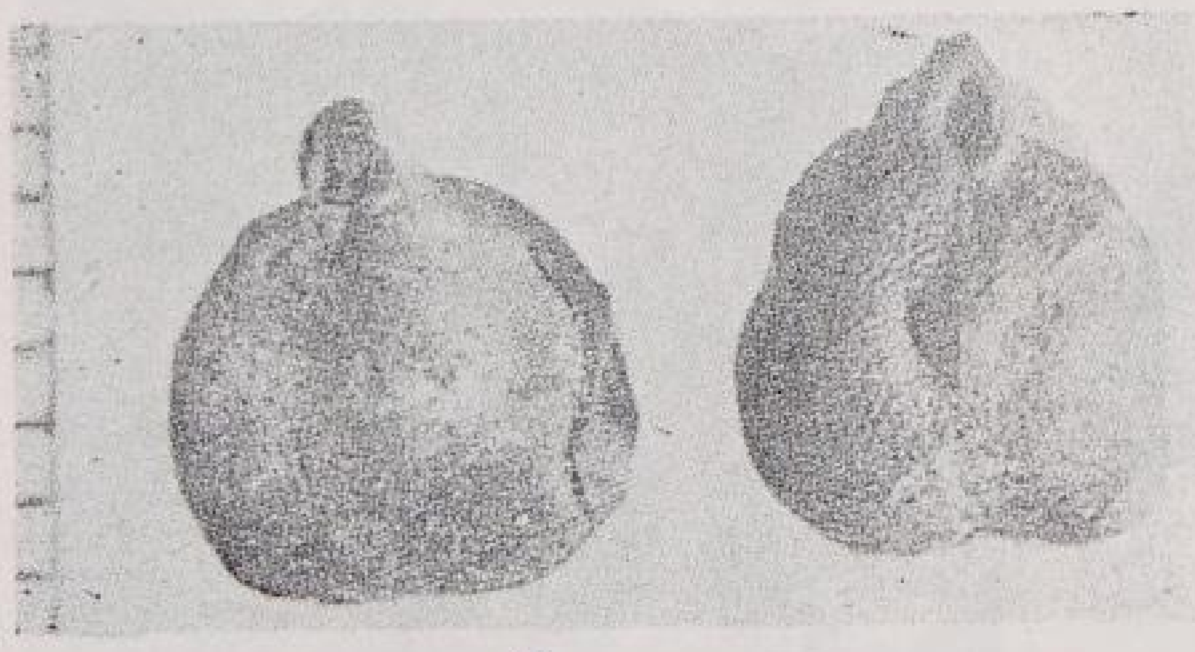
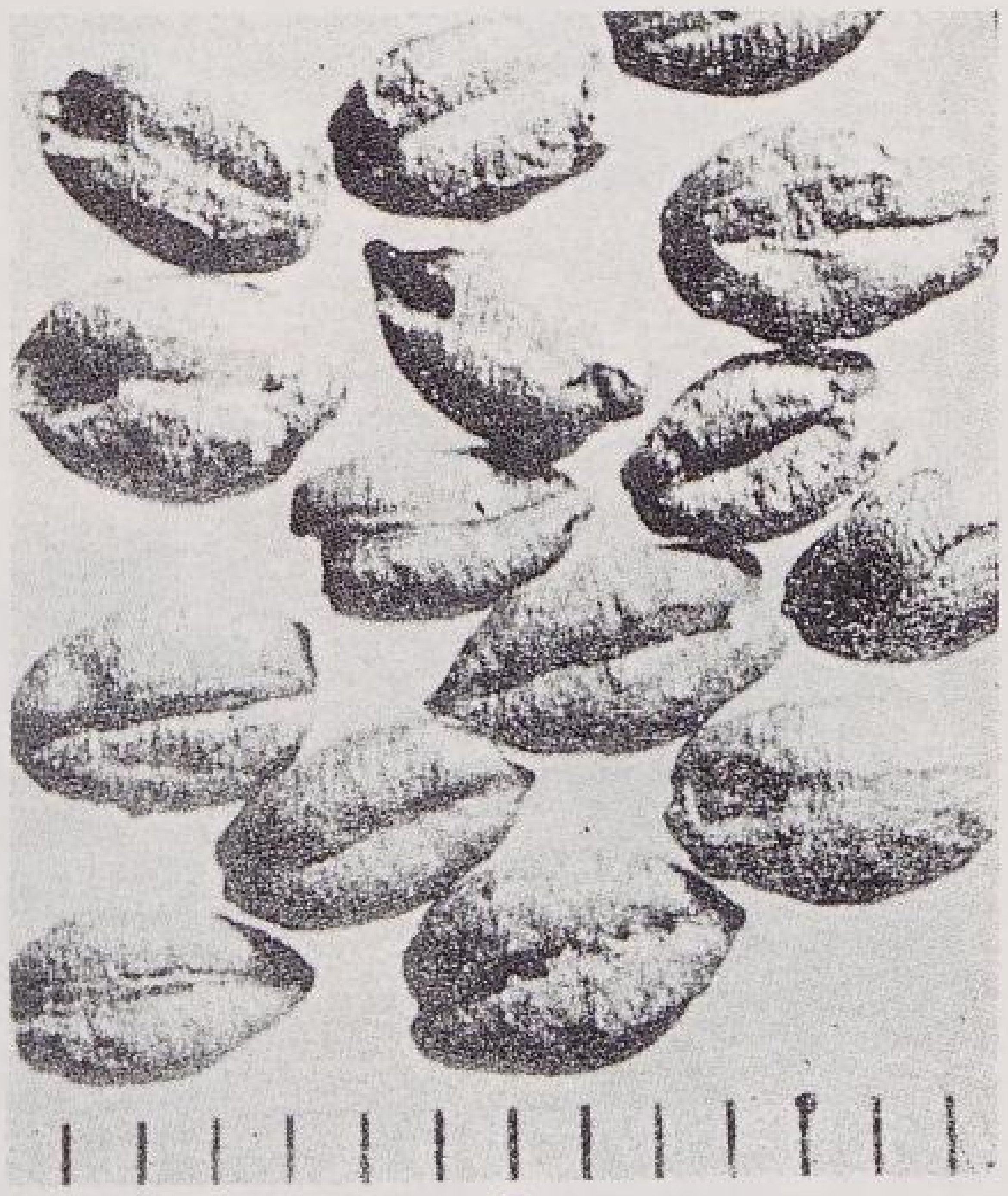
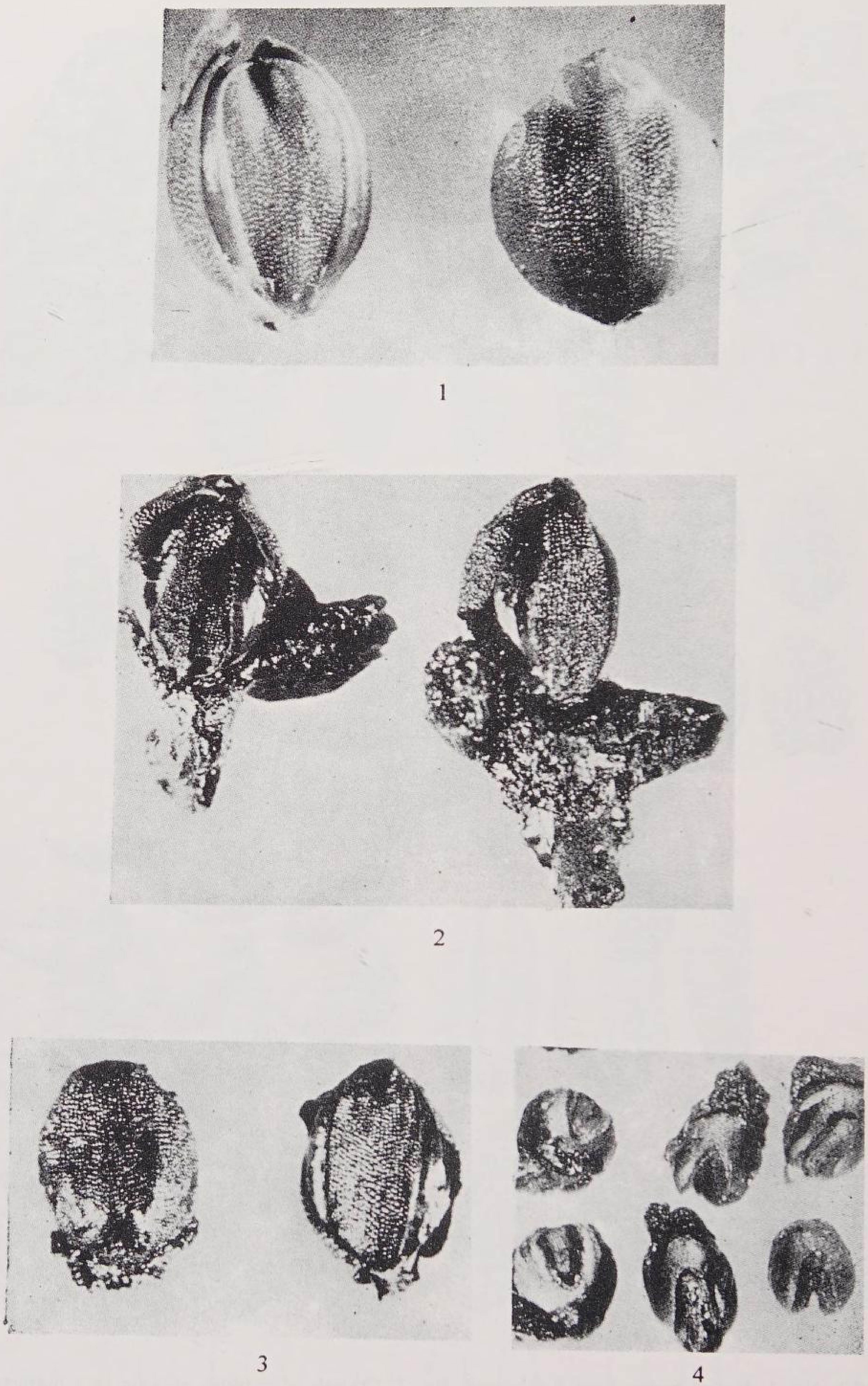


6

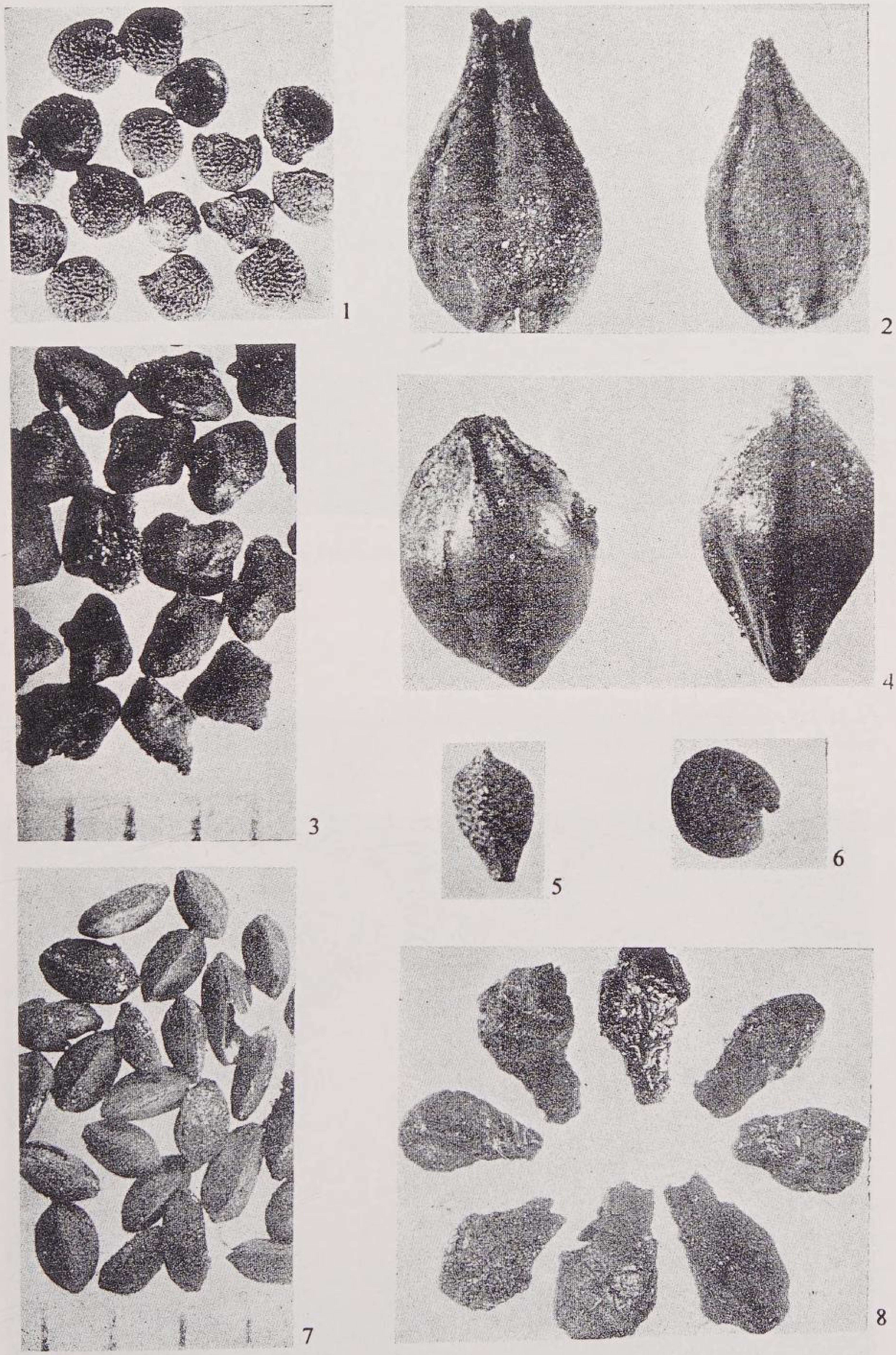


7

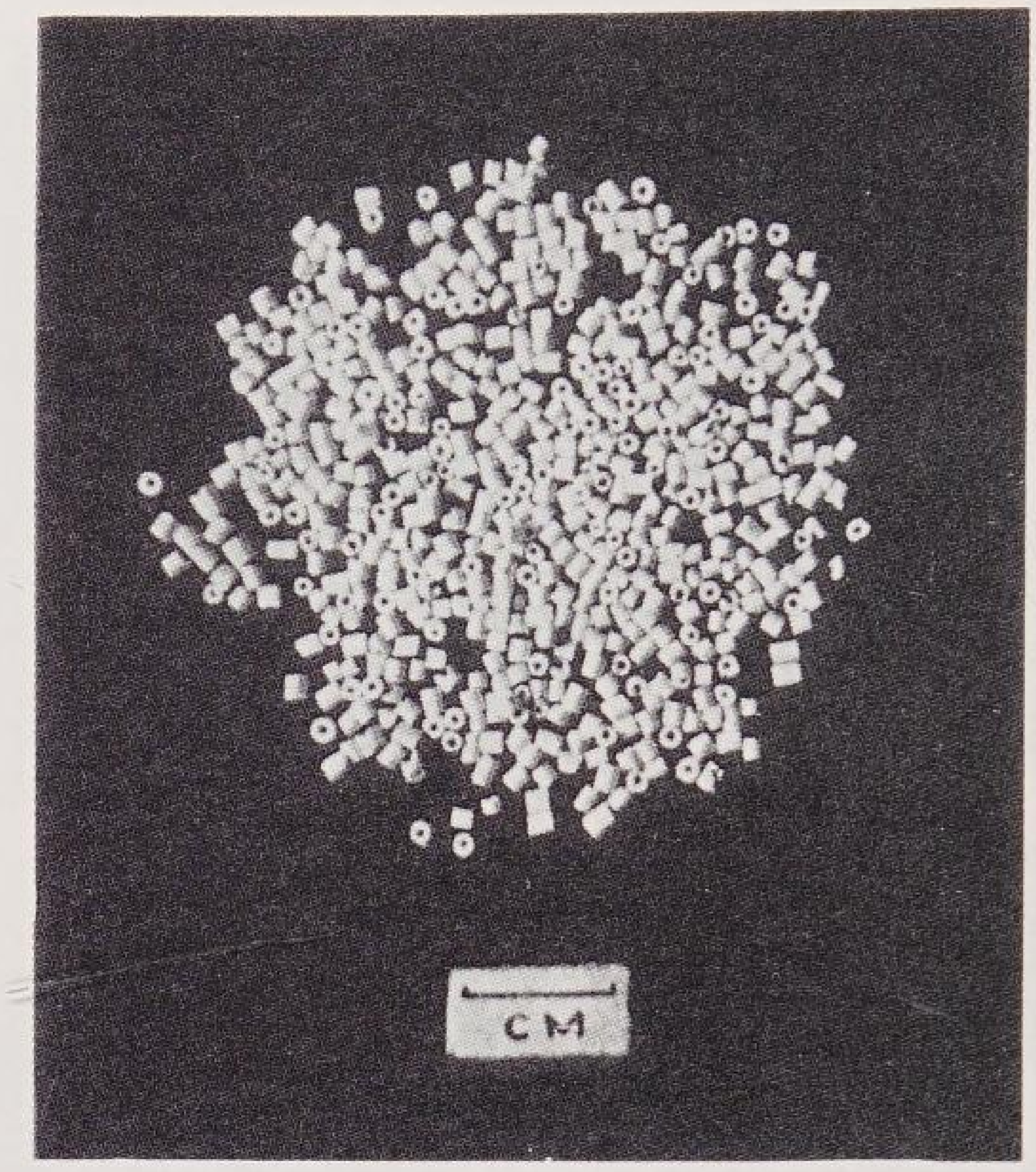
Pl. 18.3. No. 1. Hulled barley from Kalibangan. No. 2. Crystals of gypsum, sticking to a potsherd from Kalibangan. Nos. 3, 7. Naked barley from Chanhudaro. No. 4. Hulled barley from Chanhudaro. No. 5. *Pisum arvense* (grass pea) from Kalibangan. No. 6. *Cicer arietinum* (chick pea) from Kalibangan.



Pl. 18.4. No. 1. Grains of modern *Setaria italica.* No. 2. Spikelets of *Setaria* cf. *italica* from Surkotada. No. 3. Carbonized grains of *Setaria* cf. *italica* from Surkotada. No. 4. Carbonized seeds of *Eleusine* cf. coracana (ragi) from Surkotada.

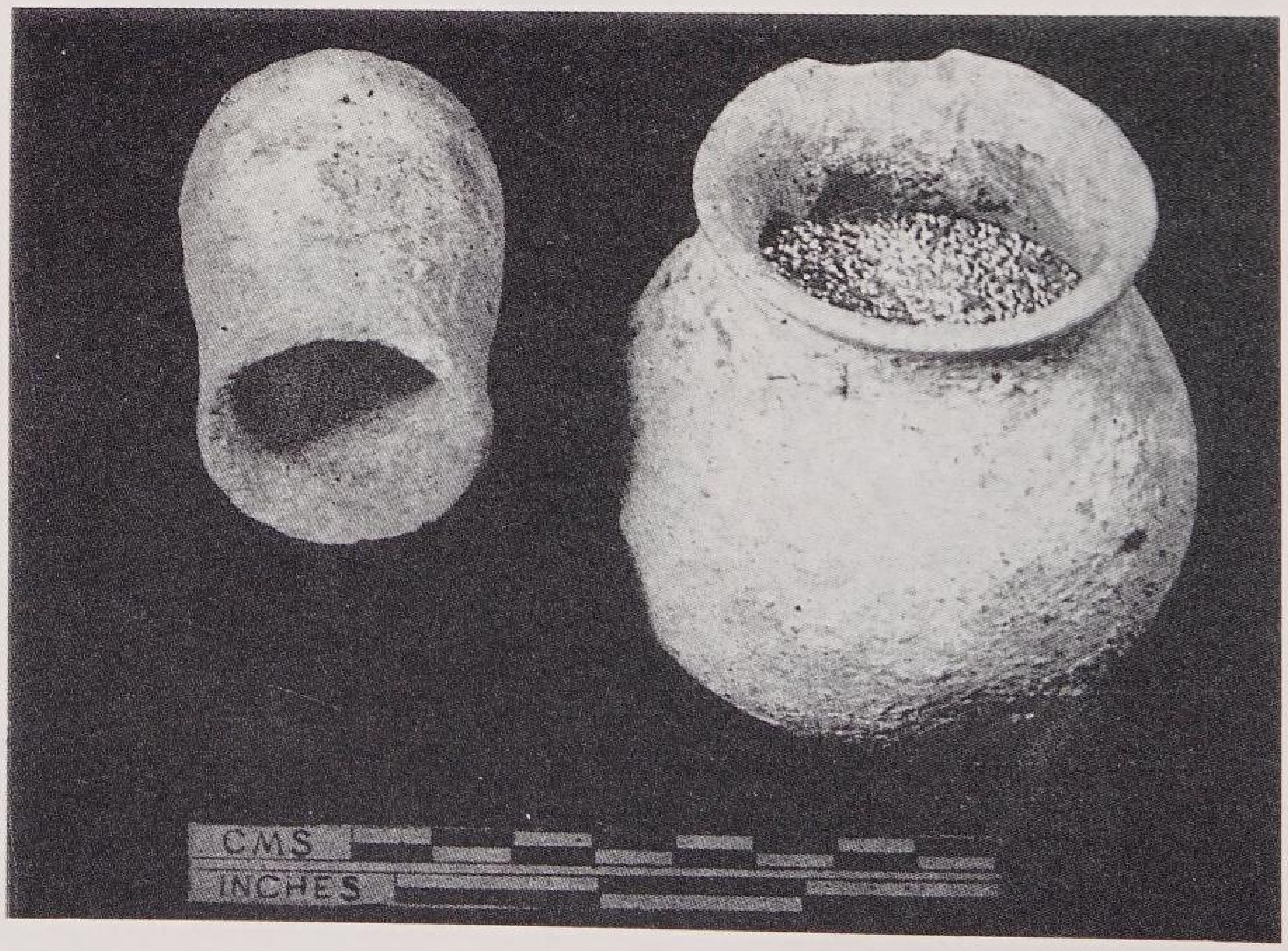


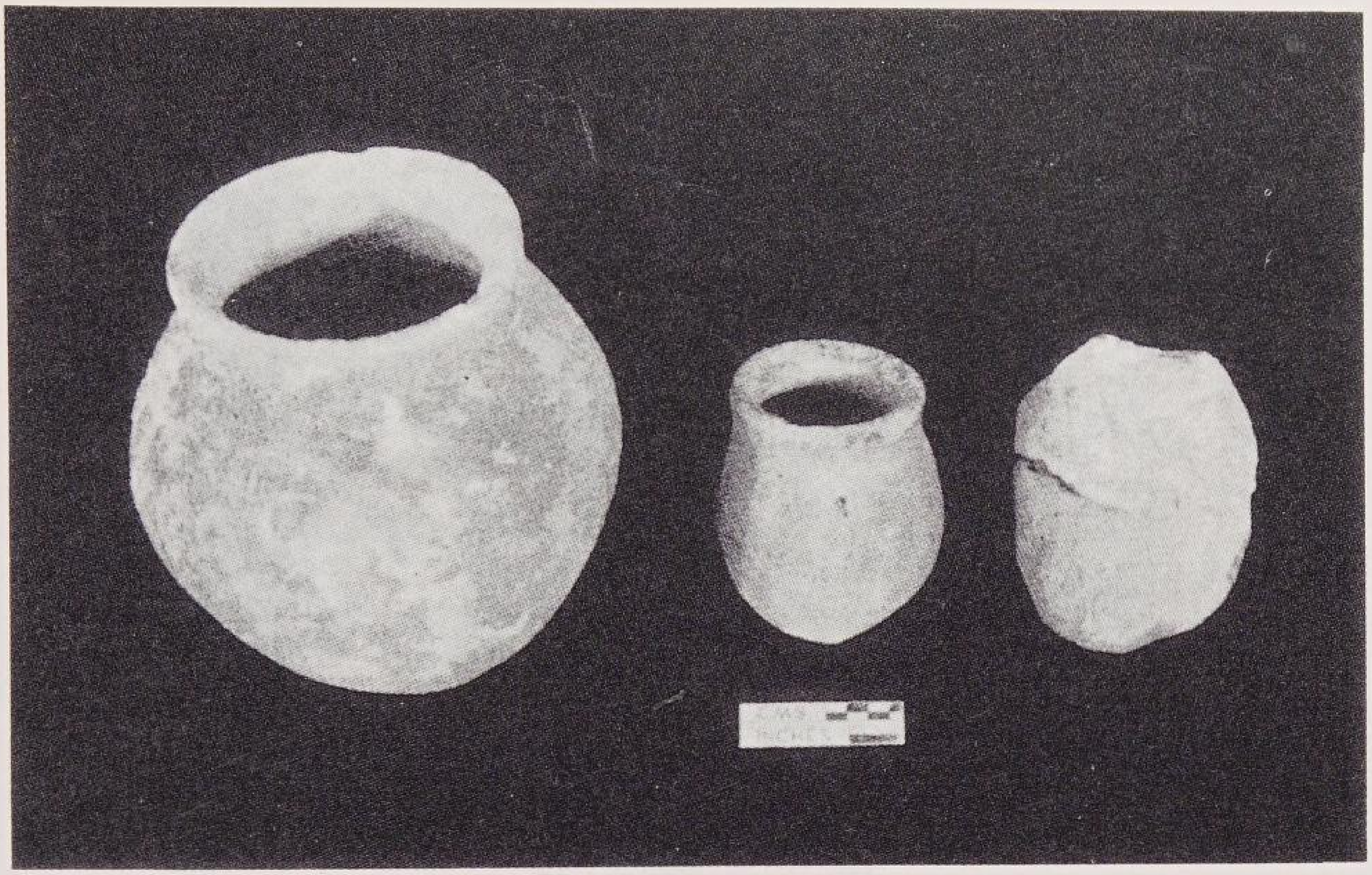
Pl. 18.5. No. 1. *Portulaca* sp. Nos. 2, 4. *Carex* sp. No. 3 *Euphorbia* sp. No. 5. Nuts of *Scirpus supinus*. No. 6. Unidentified. No. 7. *Polygonum* sp. No. 8. Wild grasses.



Pl. 21.1. Cleaned microbeads recovered from the Harappan site of Zekda.

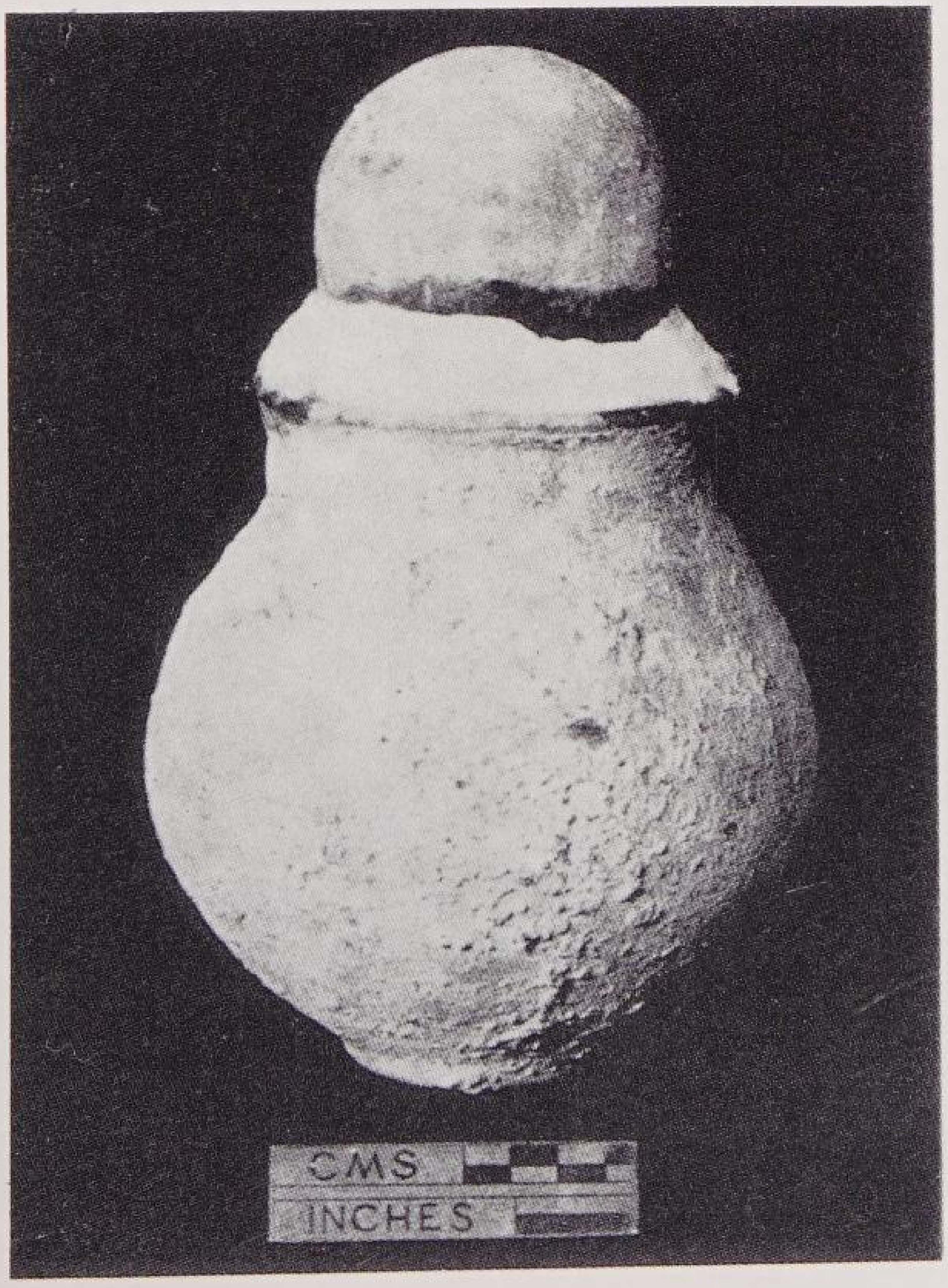
Pl. 21.2. Evidence for the careful preservation of microbeads unearthed at Zekda—The beads, mixed with fine ash, were placed inside the miniature jar fitted with a cork-like, hollow, baked clay stopper and buried under a house floor.

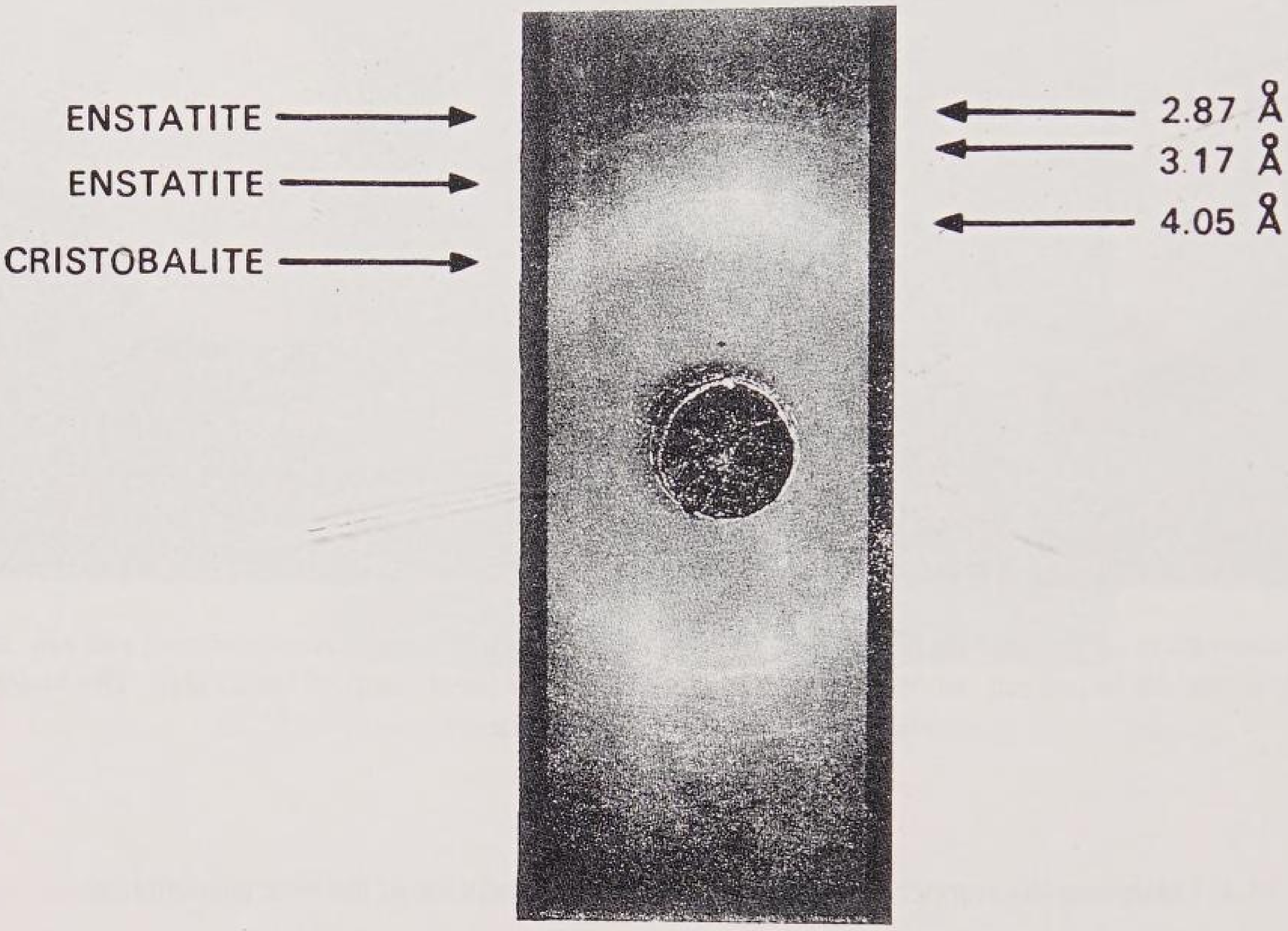




Pl. 21.3. Preservation of the microbeads. The miniature pot in the center contained microbeads and ash. It was placed inside the larger pot, whose mouth was covered with a fitted lump of baked clay. The hoard was buried beneath a house floor.

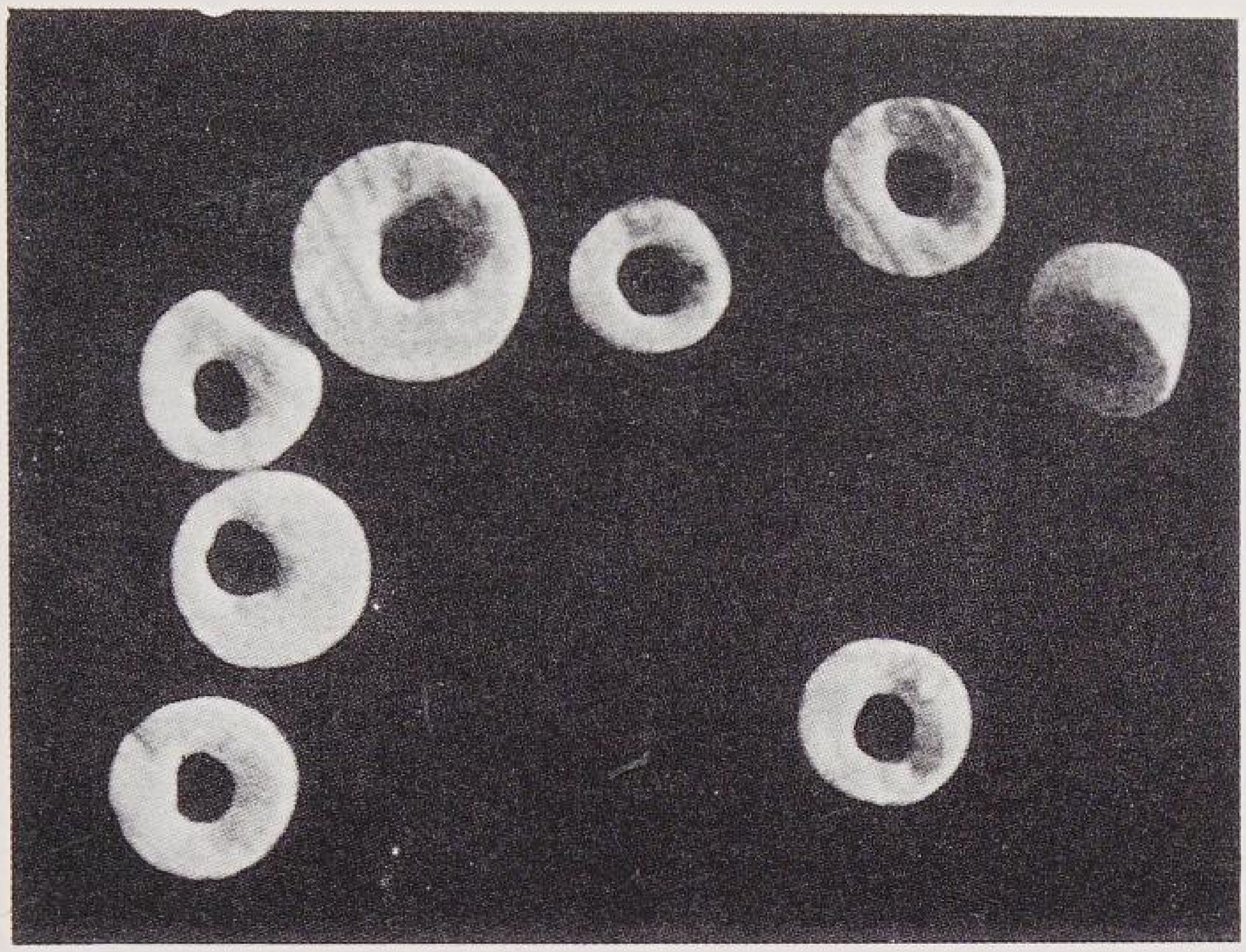
Pl. 21.4. Loosening the stopper on the bead pot: careful dissolution of the lime encrustation.




ENSTATITE
ENSTATITE
CRISTOBALITE
2.87 Å
3.17 Å
4.05 Å

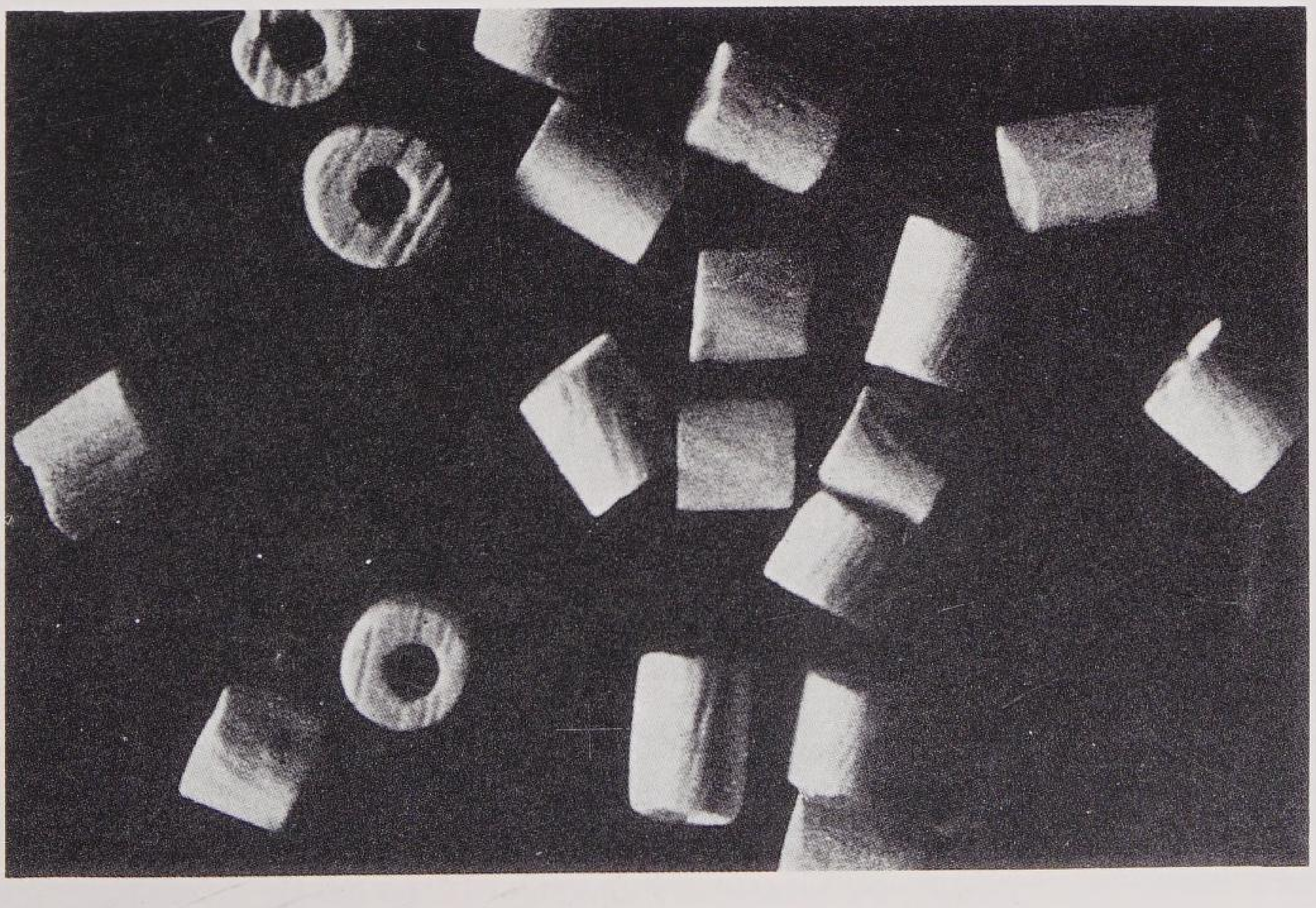
X-ray diffraction patterns obtained on a powdered sample of the beads

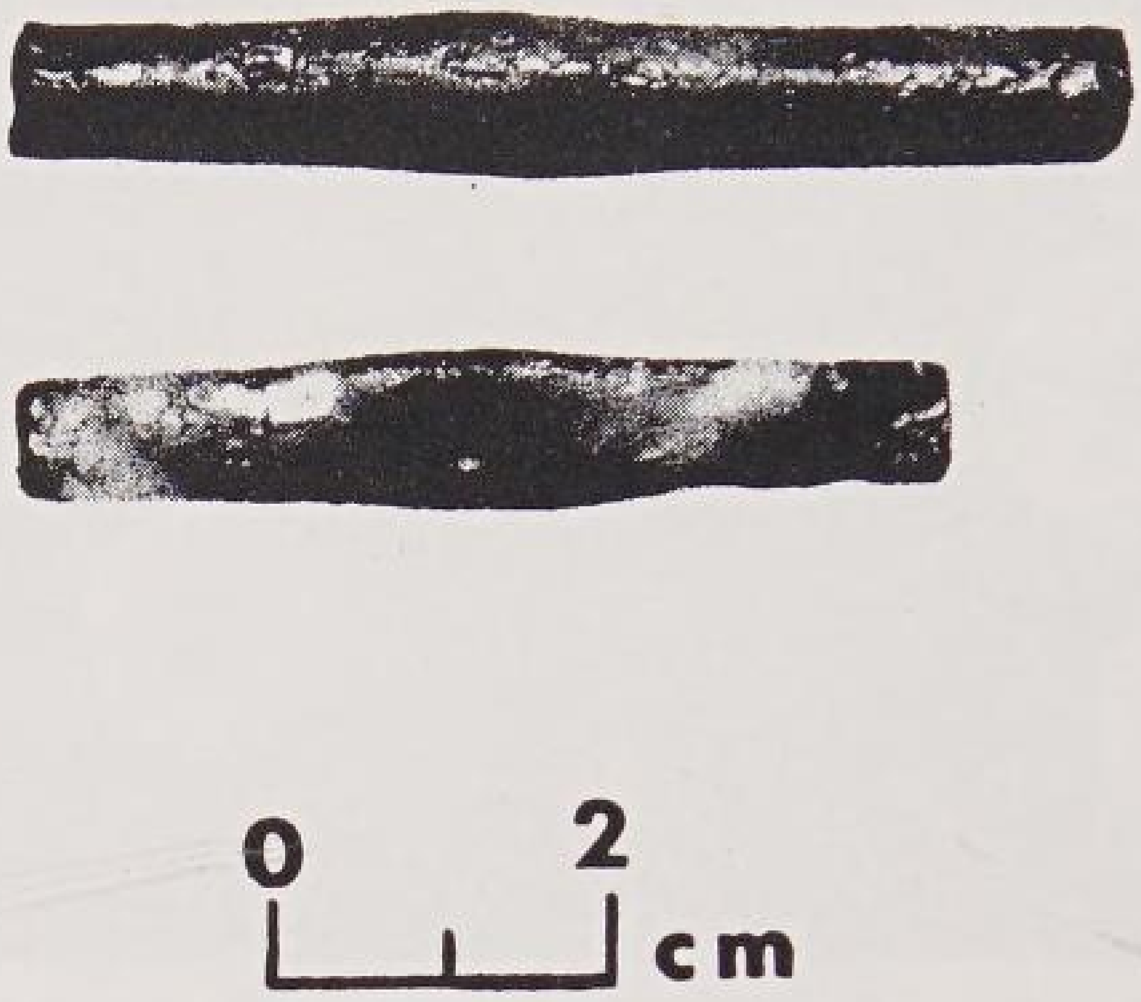
Pl. 21.5. X-ray diffraction patterns obtained from a powdered sample of the beads.



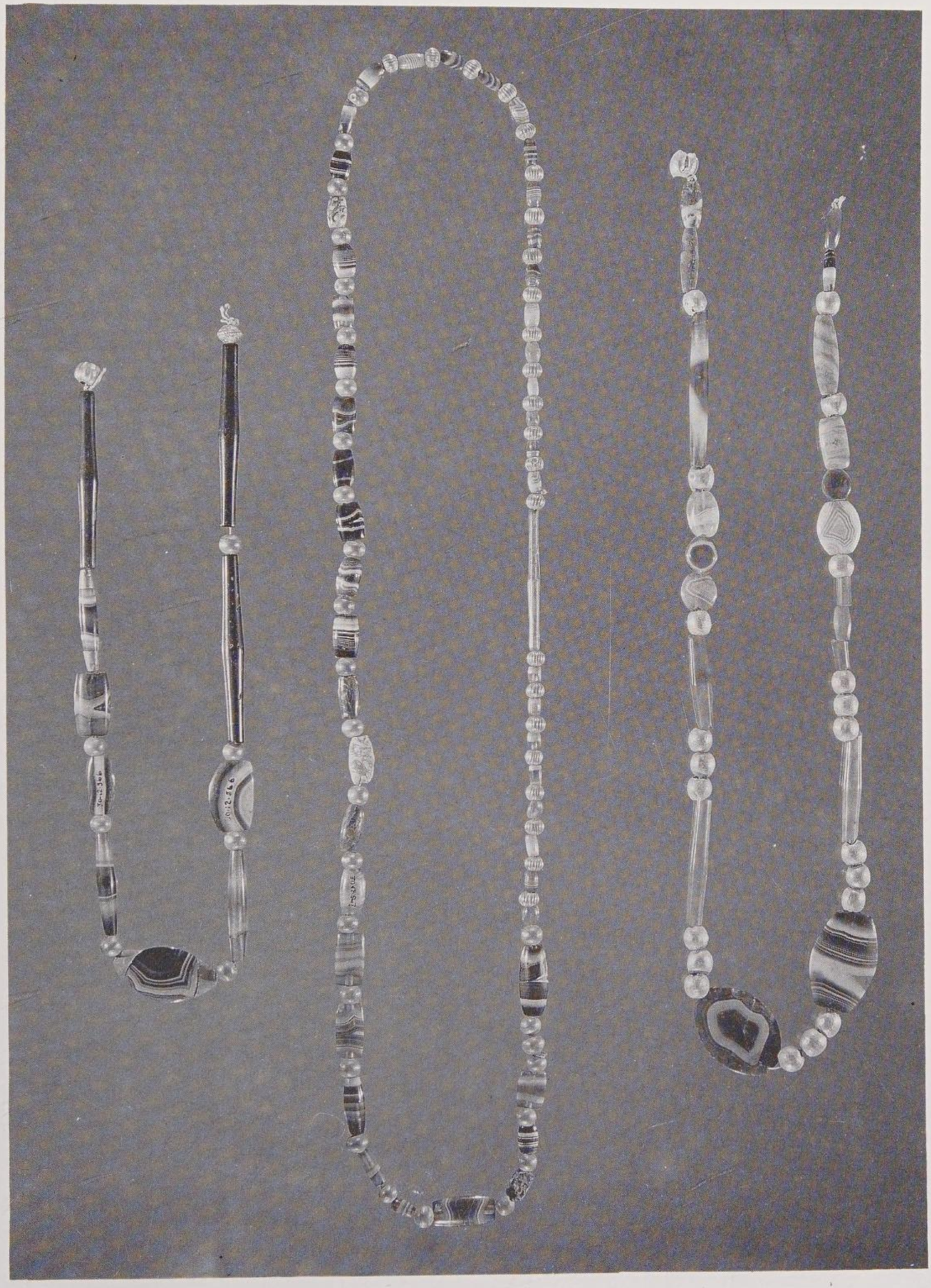
Pl. 21.6. Smooth, straight, even cut edges of the beads (magnified 15 times). This photograph shows that the beads were cut when soft; not after they were hardened and made brittle by baking.

Pl. 21.7. Furrow marks on the length of the beads (magnified 15 times). These striations show that the beads were manufactured by extruding the bead-forming pasty compound through small apertures.

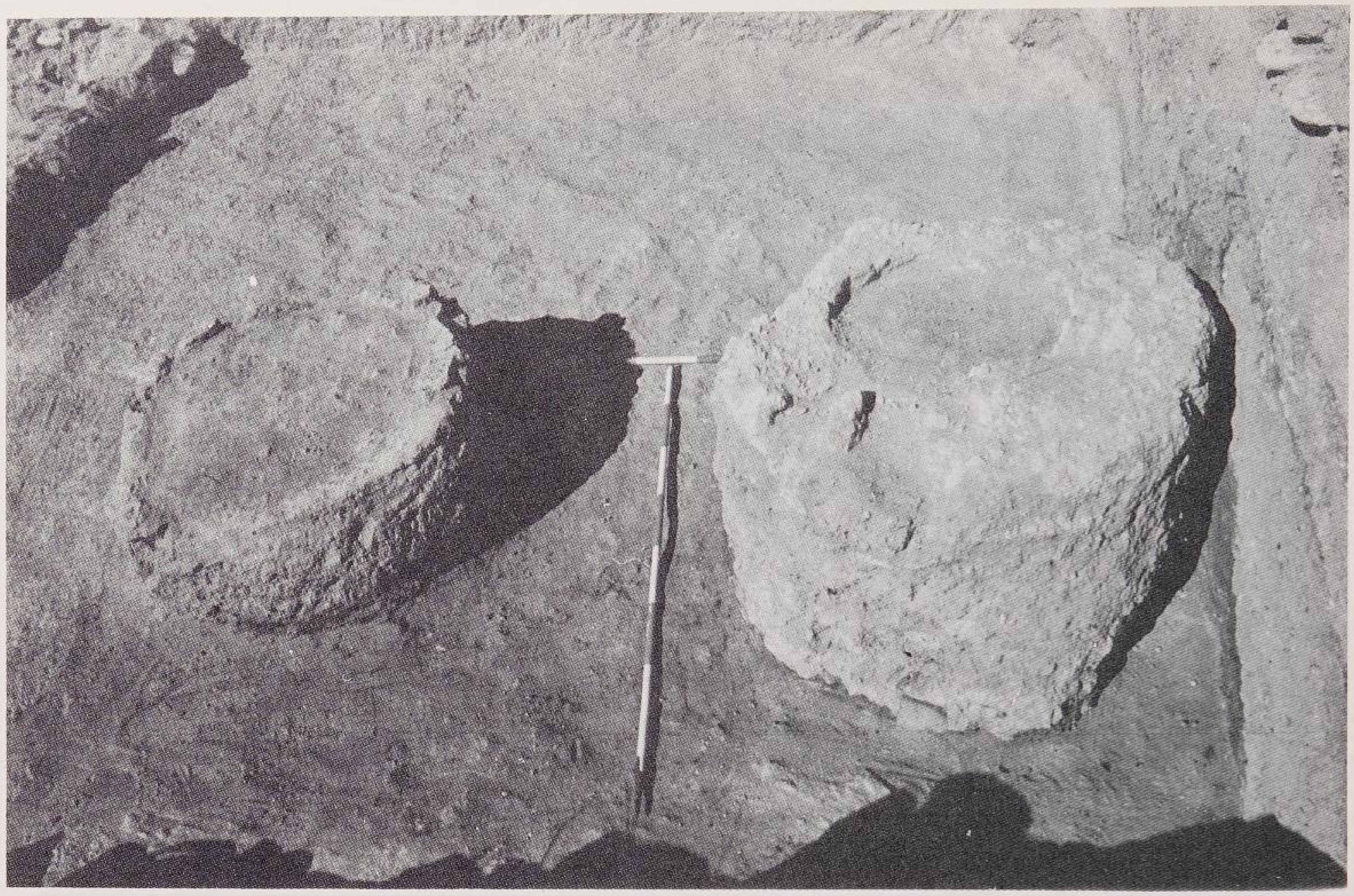




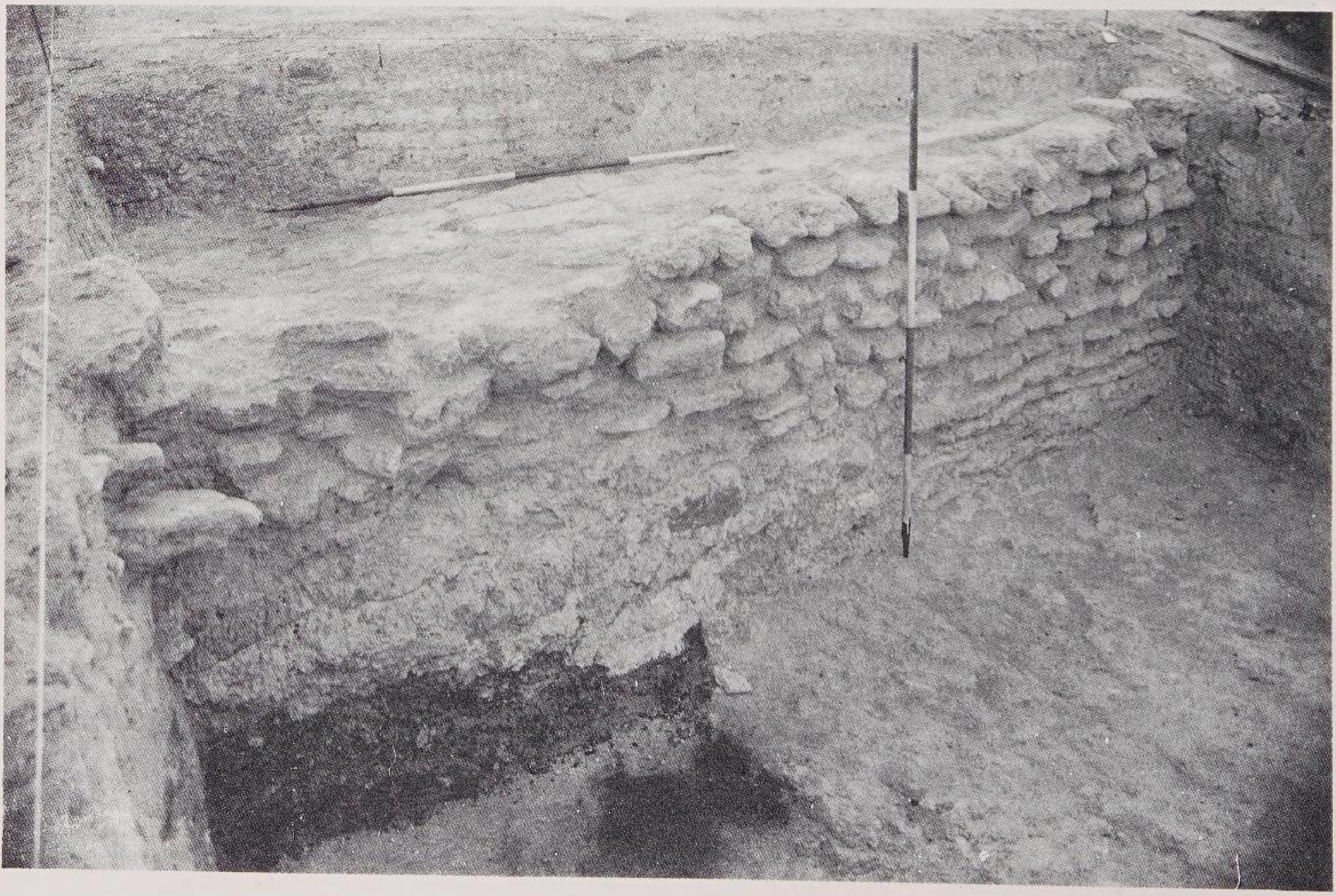
Pl. 24.1. Unfinished long barrel-cylinder beads from Chanhudaro. Top: 36.1507; Bottom: 36.1564. Boston Museum of Fine Arts.



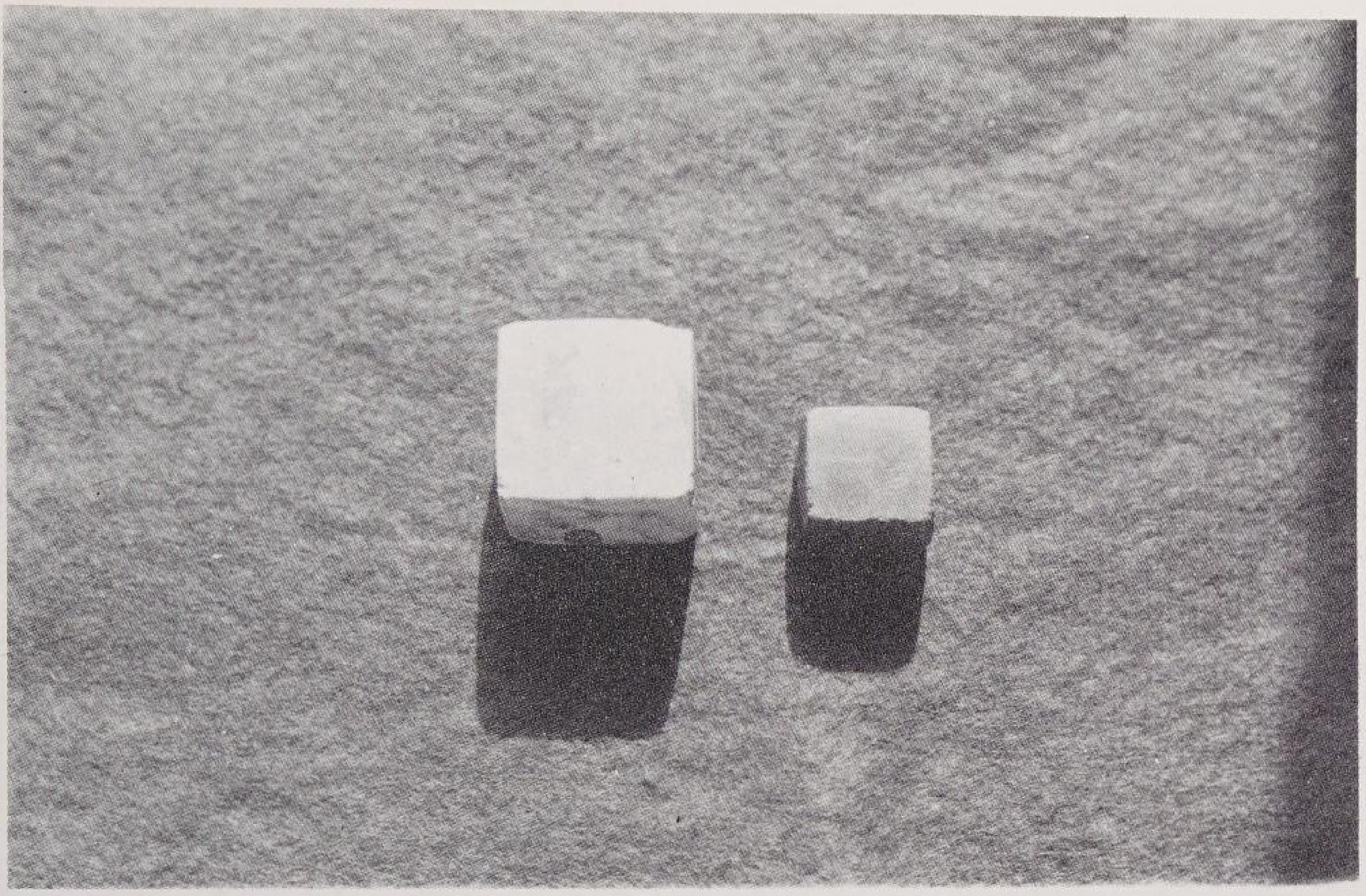
Pl. 24.2. Long barrel-cylinder beads from the Royal Graves of Ur. Akkadian Period. Bead 'b' is 6.4 Centimeters in length.



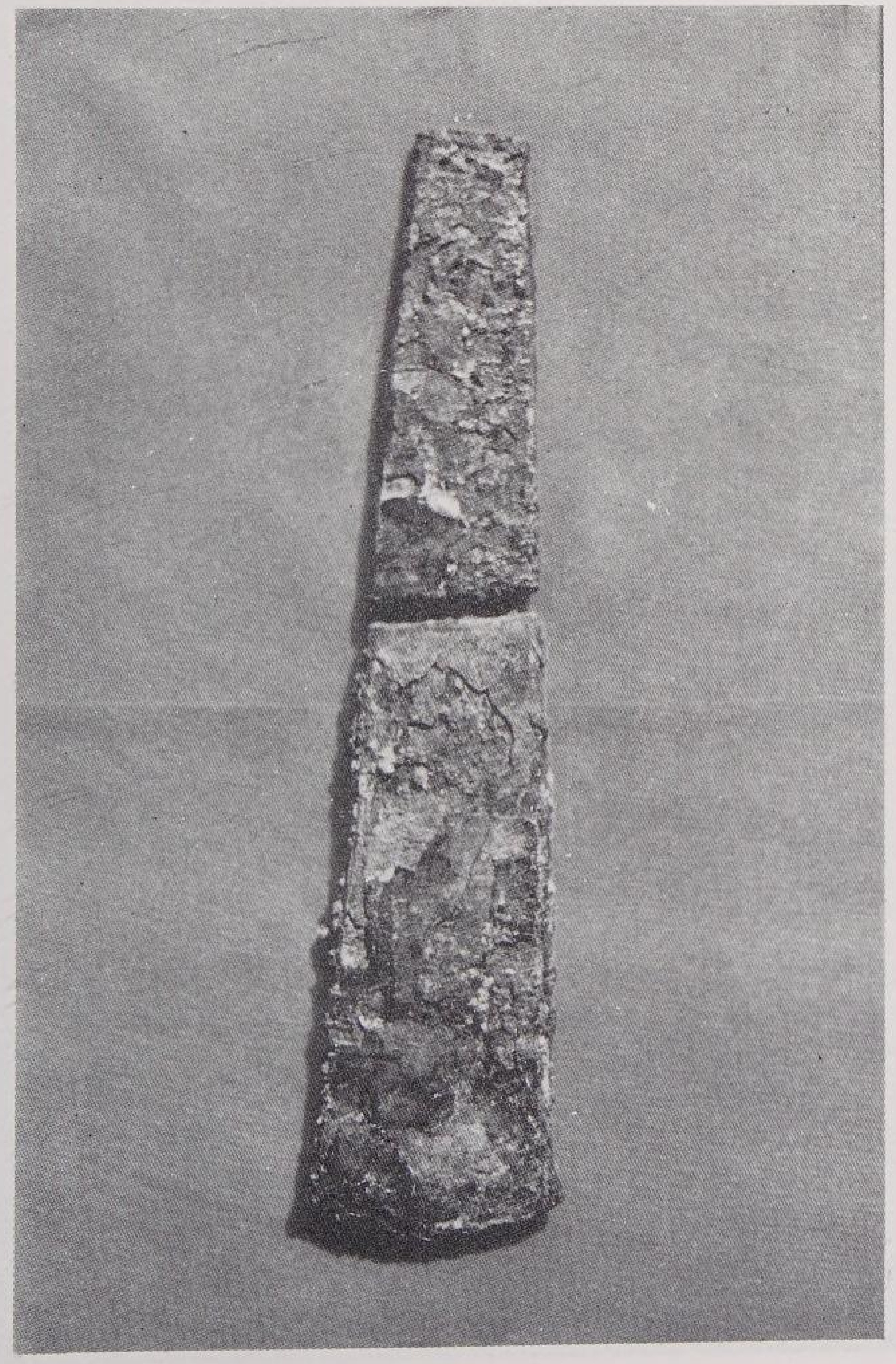
Pl. 28.1. Ovens at Tell Abraq.



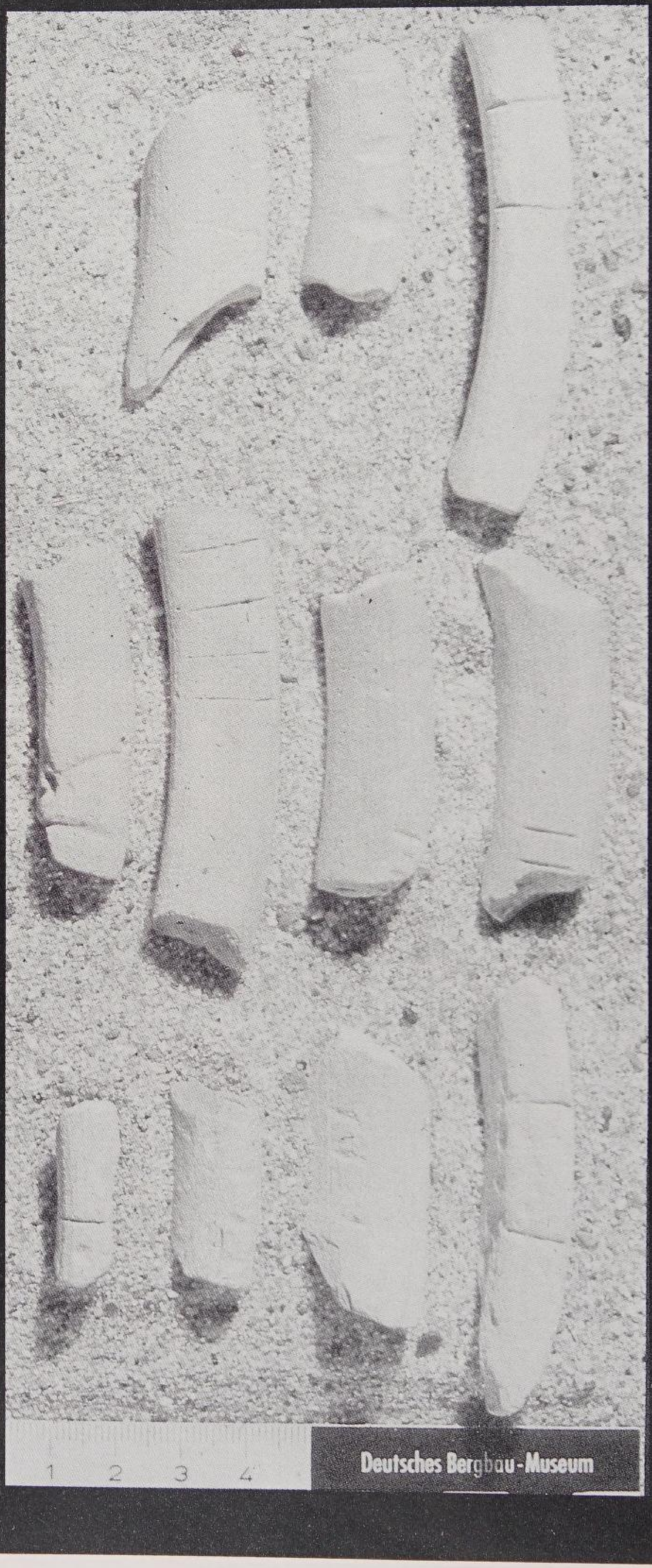
Pl. 28.2. Fireplace at Tell Abraq.



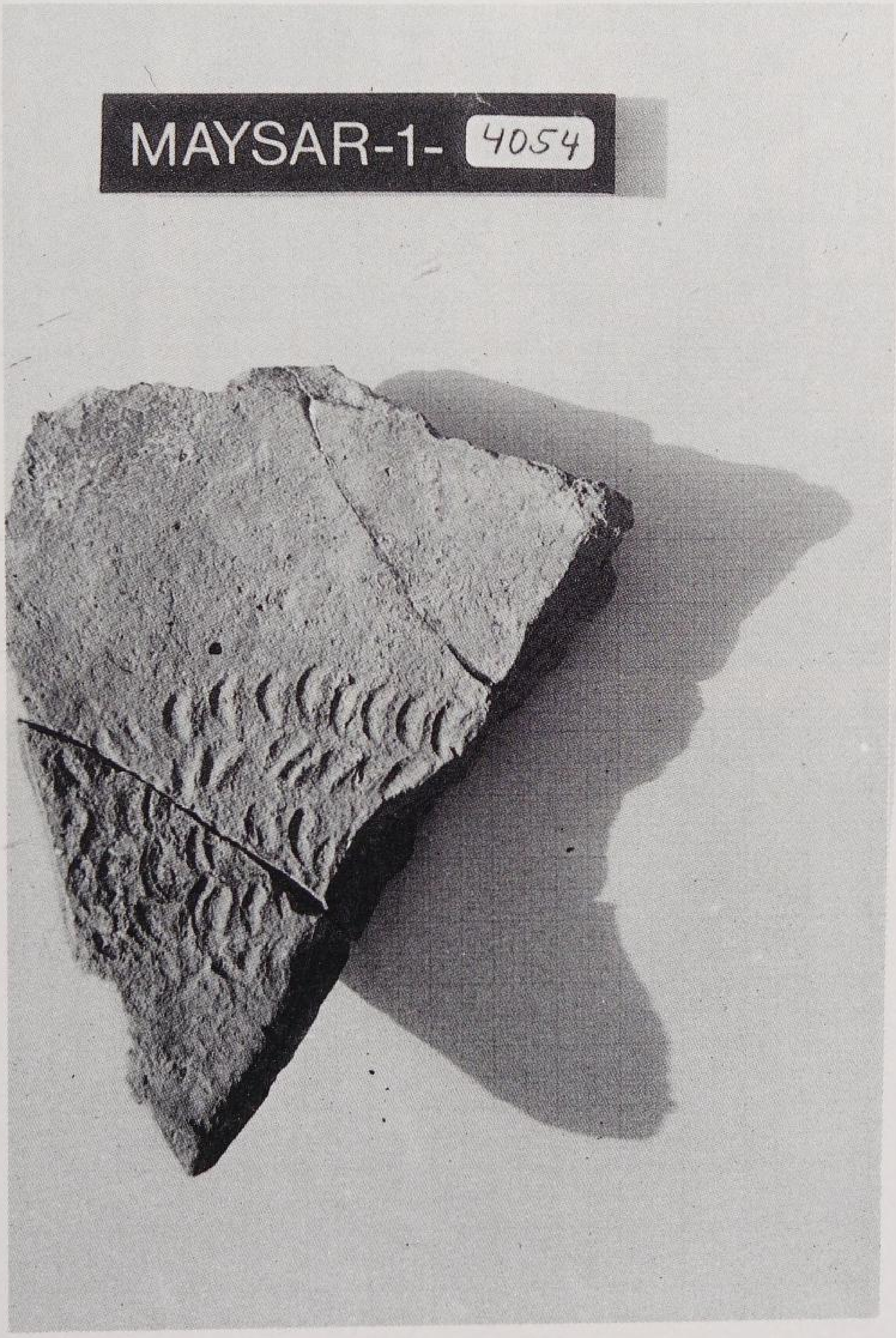
Pl. 28.3. Cubical weights from Tell Abraq.



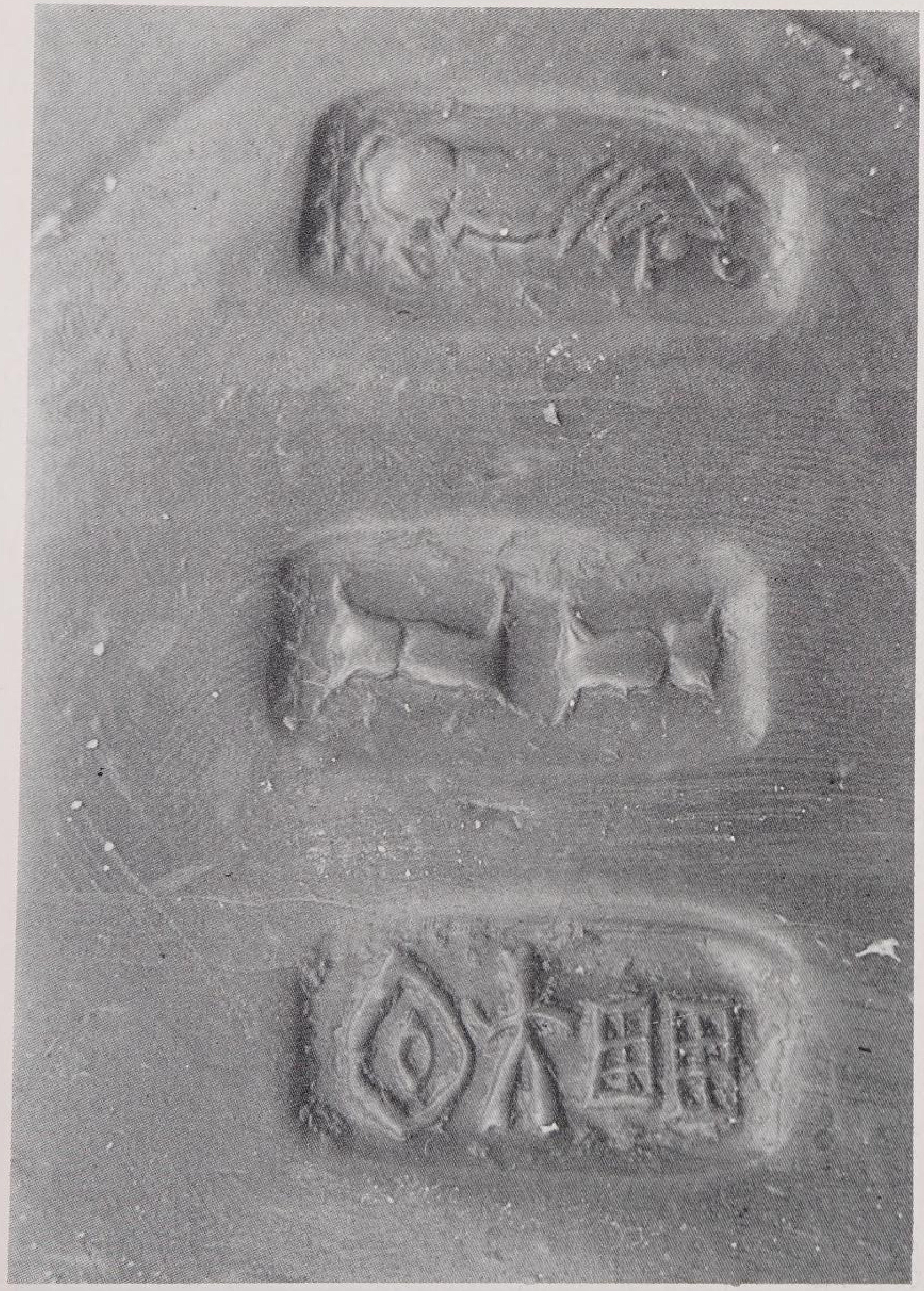
Pl. 28.4. Copper or bronze blade-axe from Tell Abraq.


1 2 3 4
Deutsches Bergbau-Museum

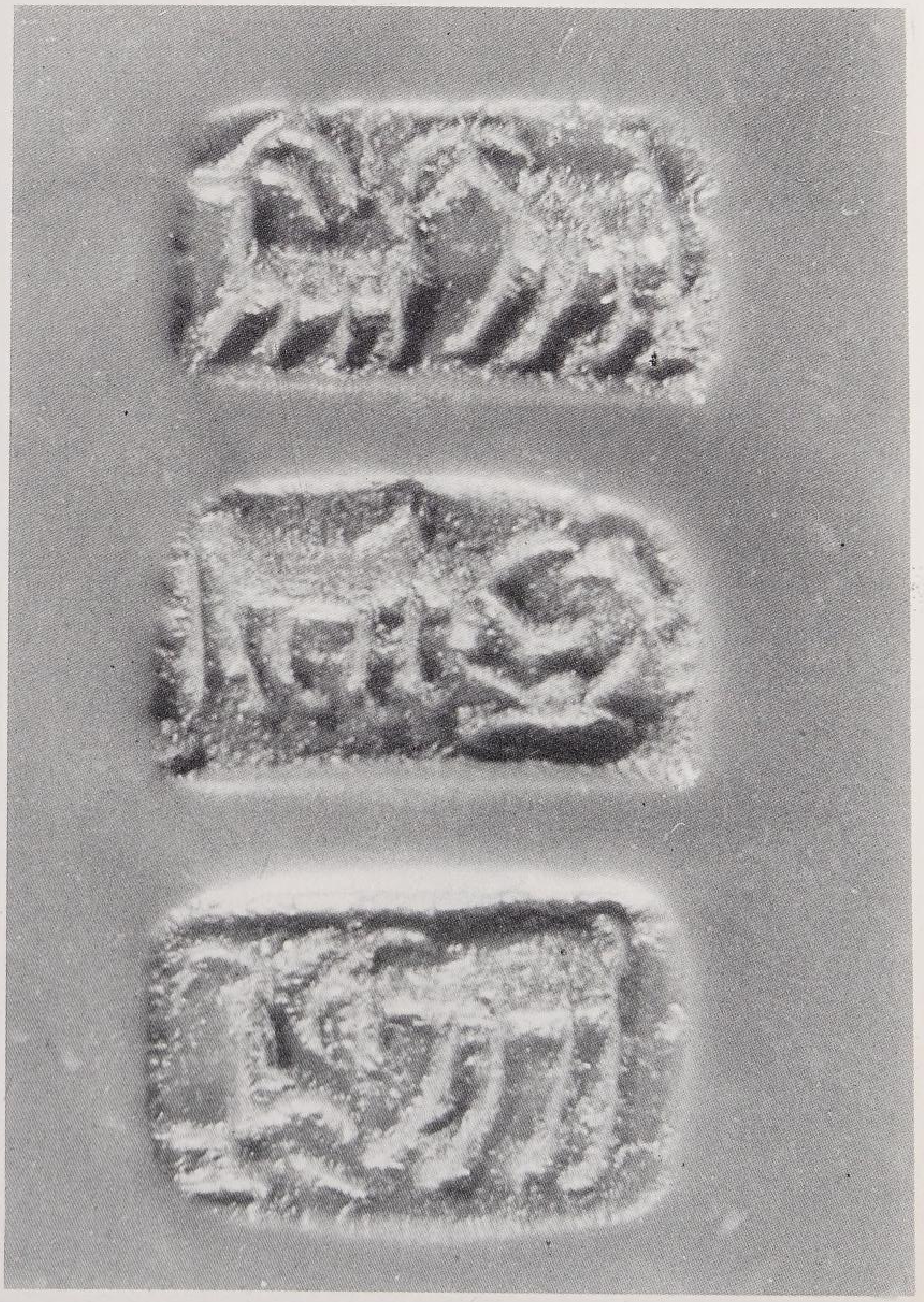
Pl. 29.1. Rimsherds with incisions.


MAYSAR-1- 4054

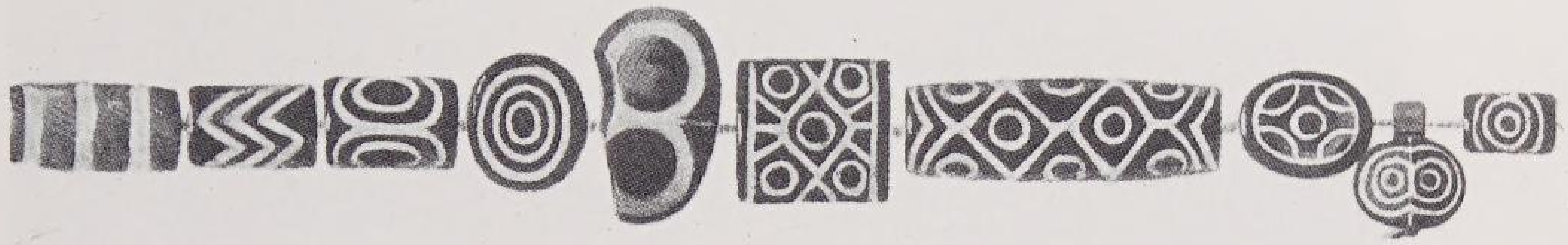
Pl. 29.2. Dep. Antique Inv. Da. 4054.



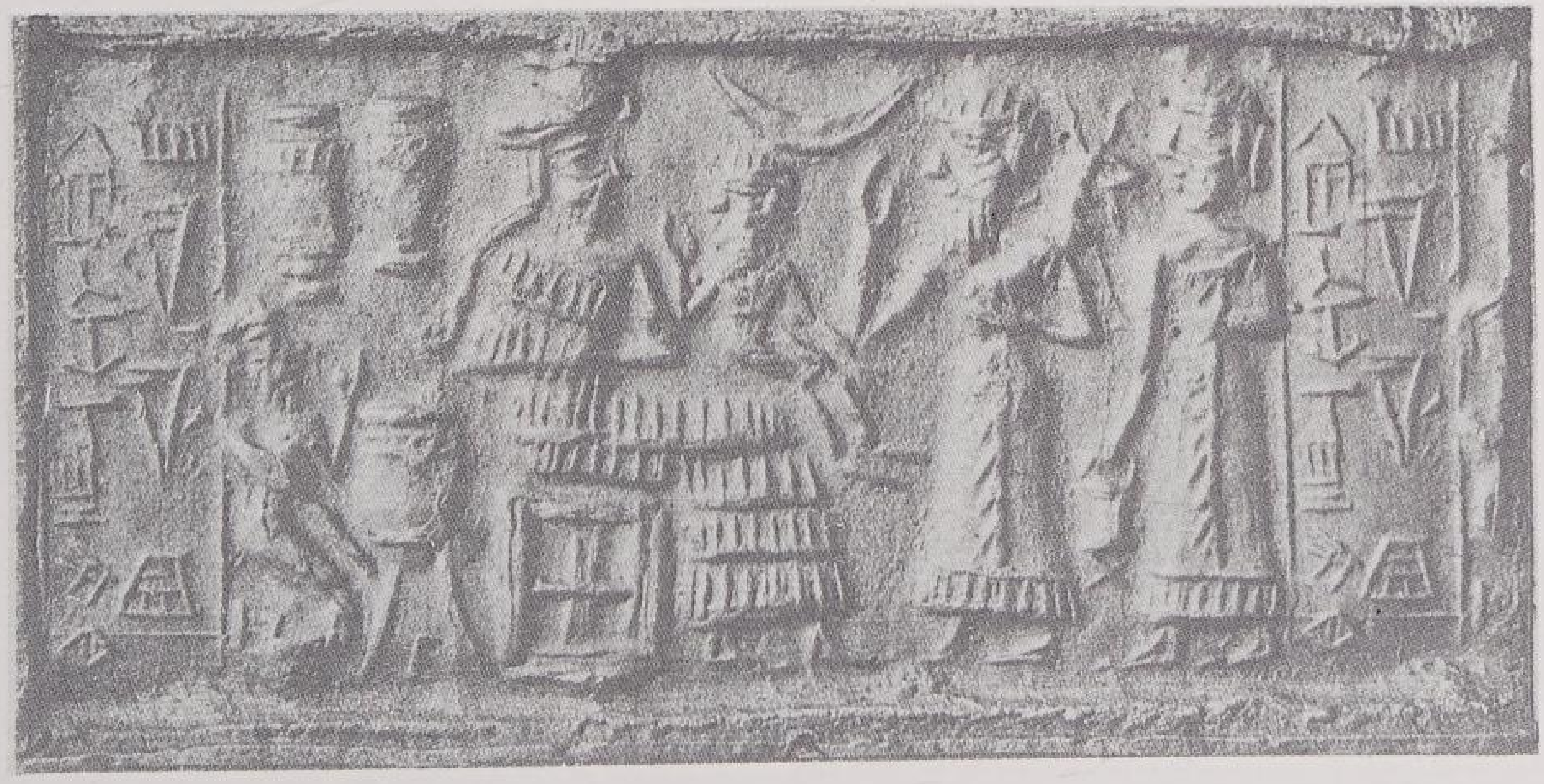
Pl. 29.3A. Bahrain Al Hajjar Cemetery seal impression.



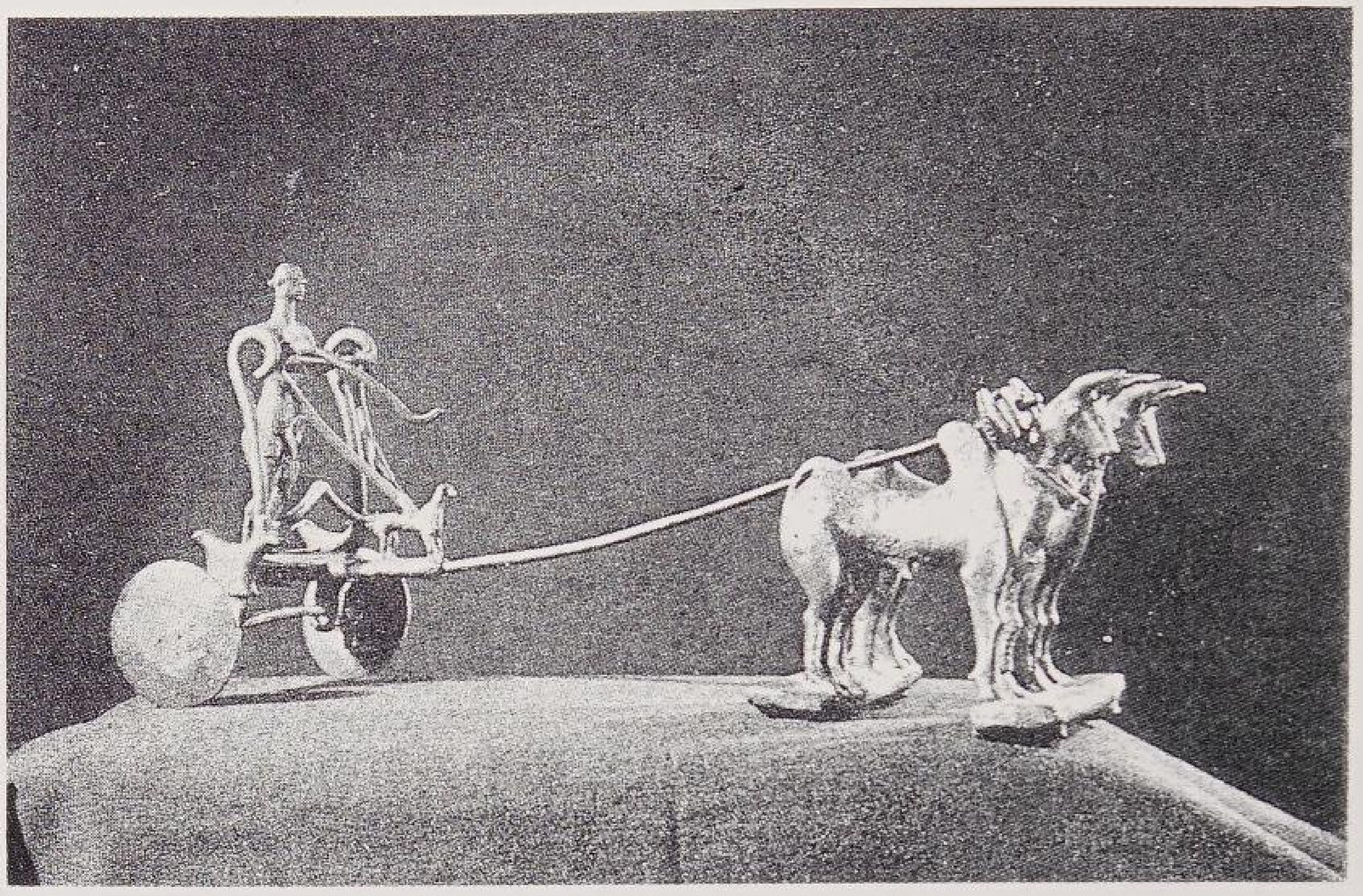
Pl. 29.3B. DA 4000 seal impression.



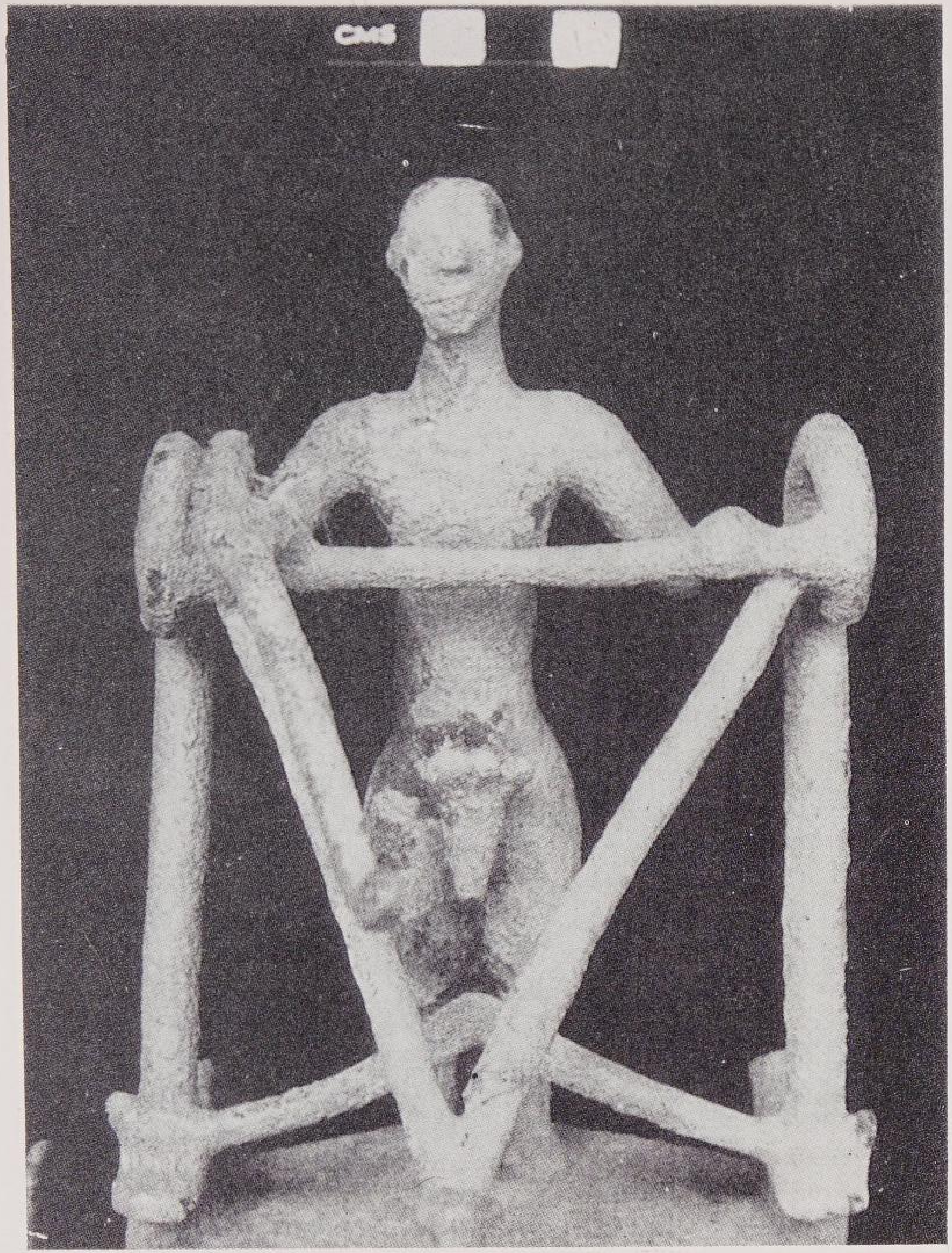
Pl. 30.1. Etched carnelian beads from Ur



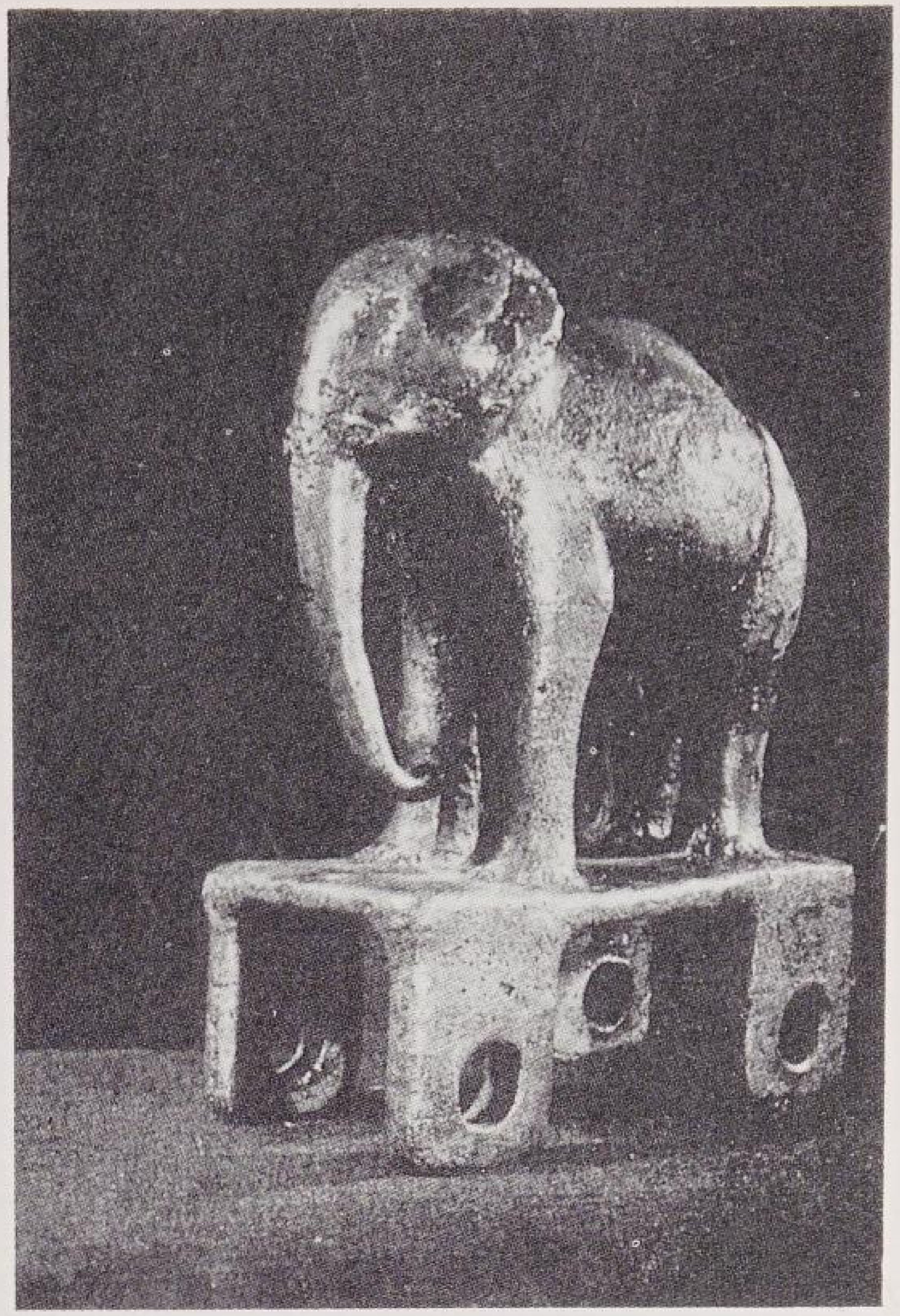
Pl. 30.2. Akkadian cylinder seal impression of a translator of the Meluhhan language.



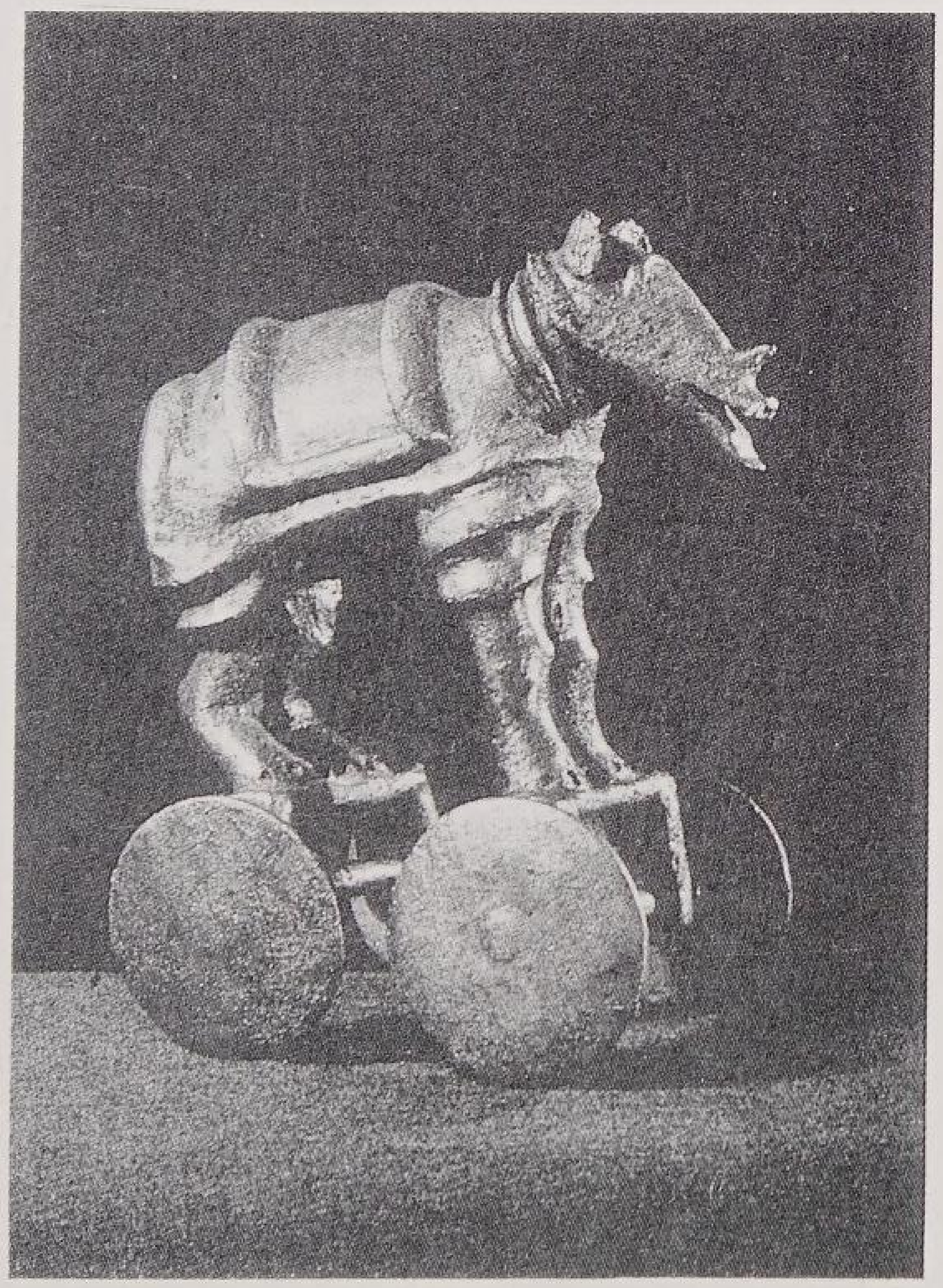
Pl. 36.1. Daimabad chariot and bulls.



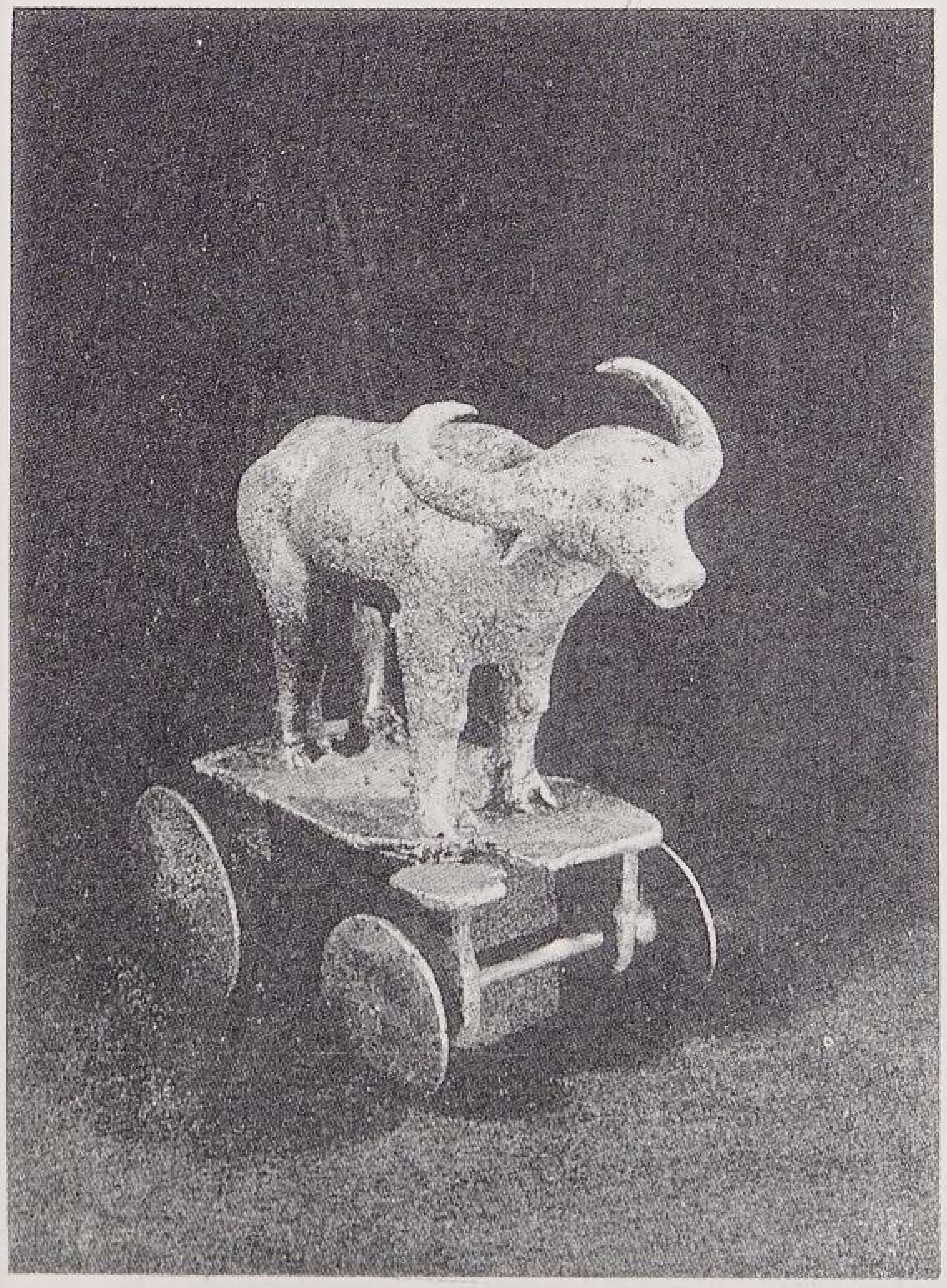
Pl. 36.2. Daimabad. Detail of the human figure in the chariot.



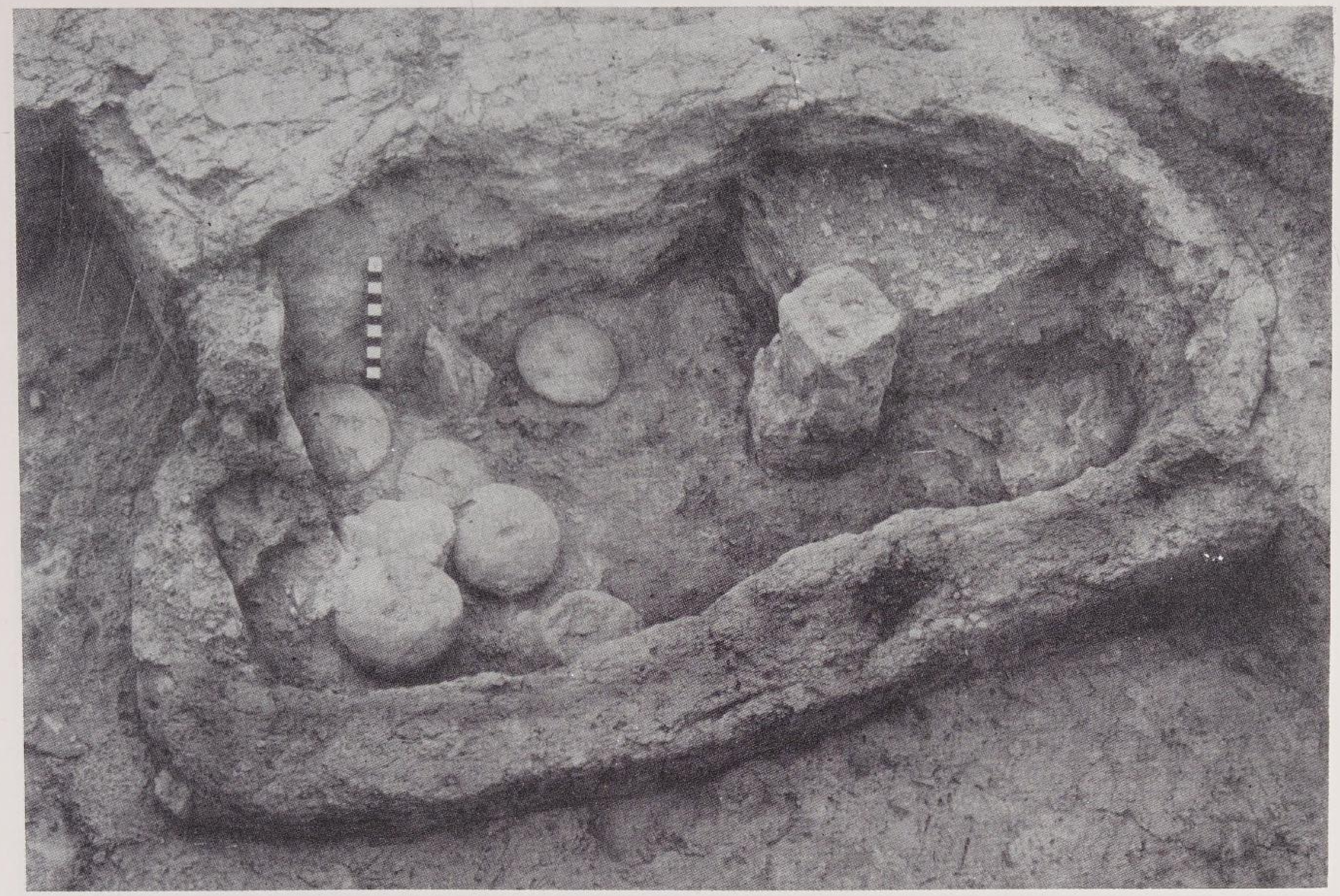
Pl. 36.3. Daimabad elephant.



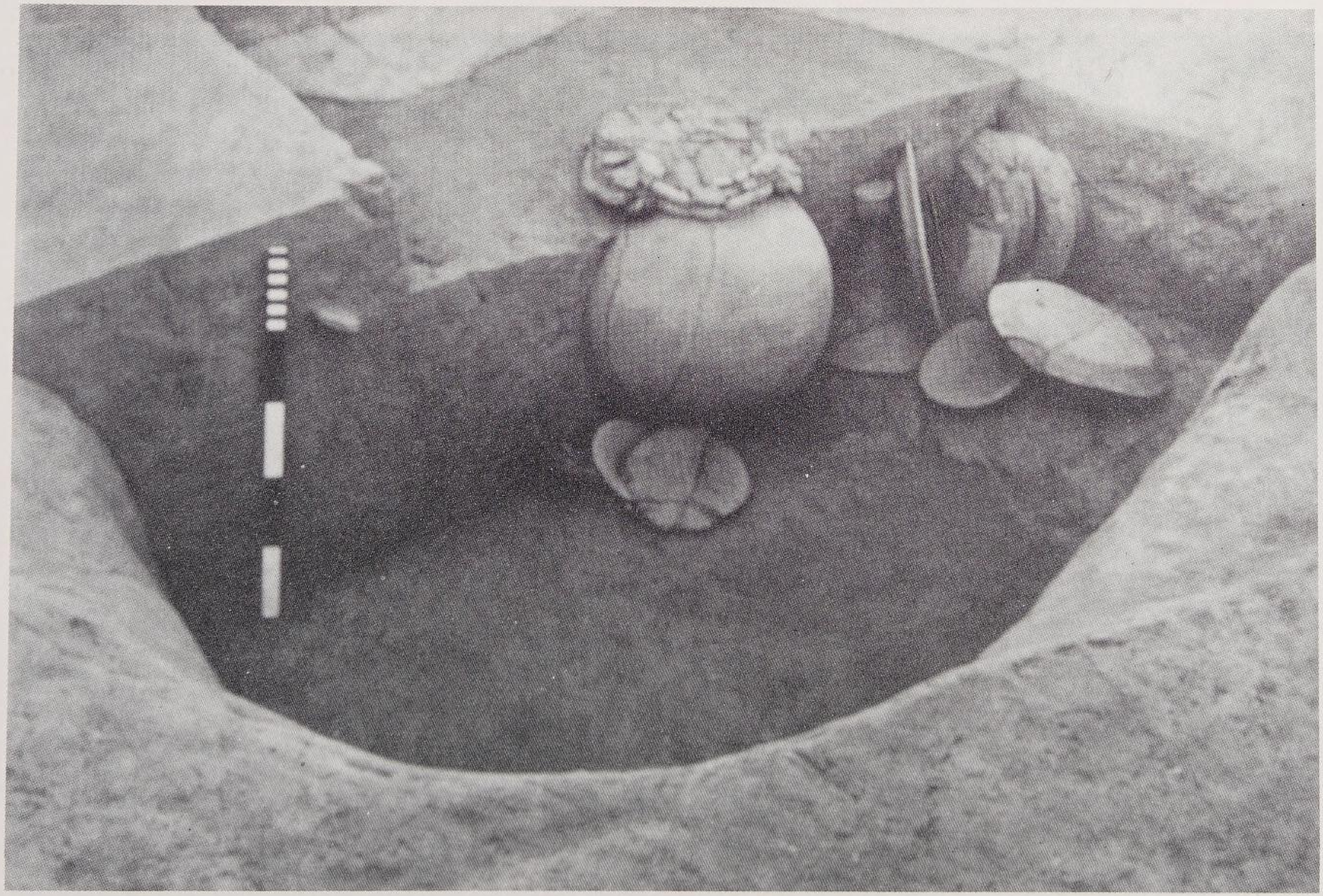
Pl. 36.4. Daimabad rhinoceros.



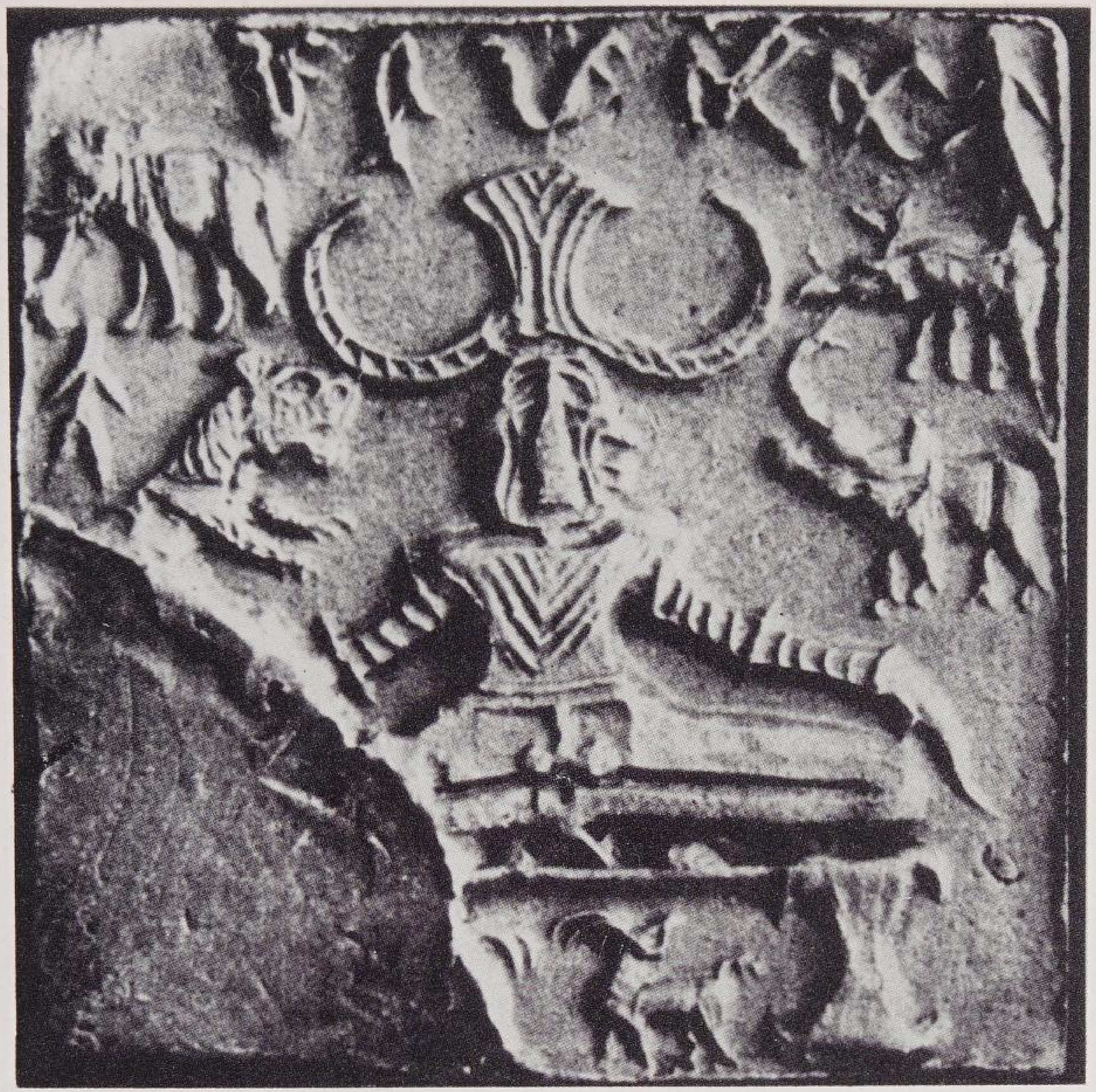
Pl. 36.5. Daimabad water buffalo.



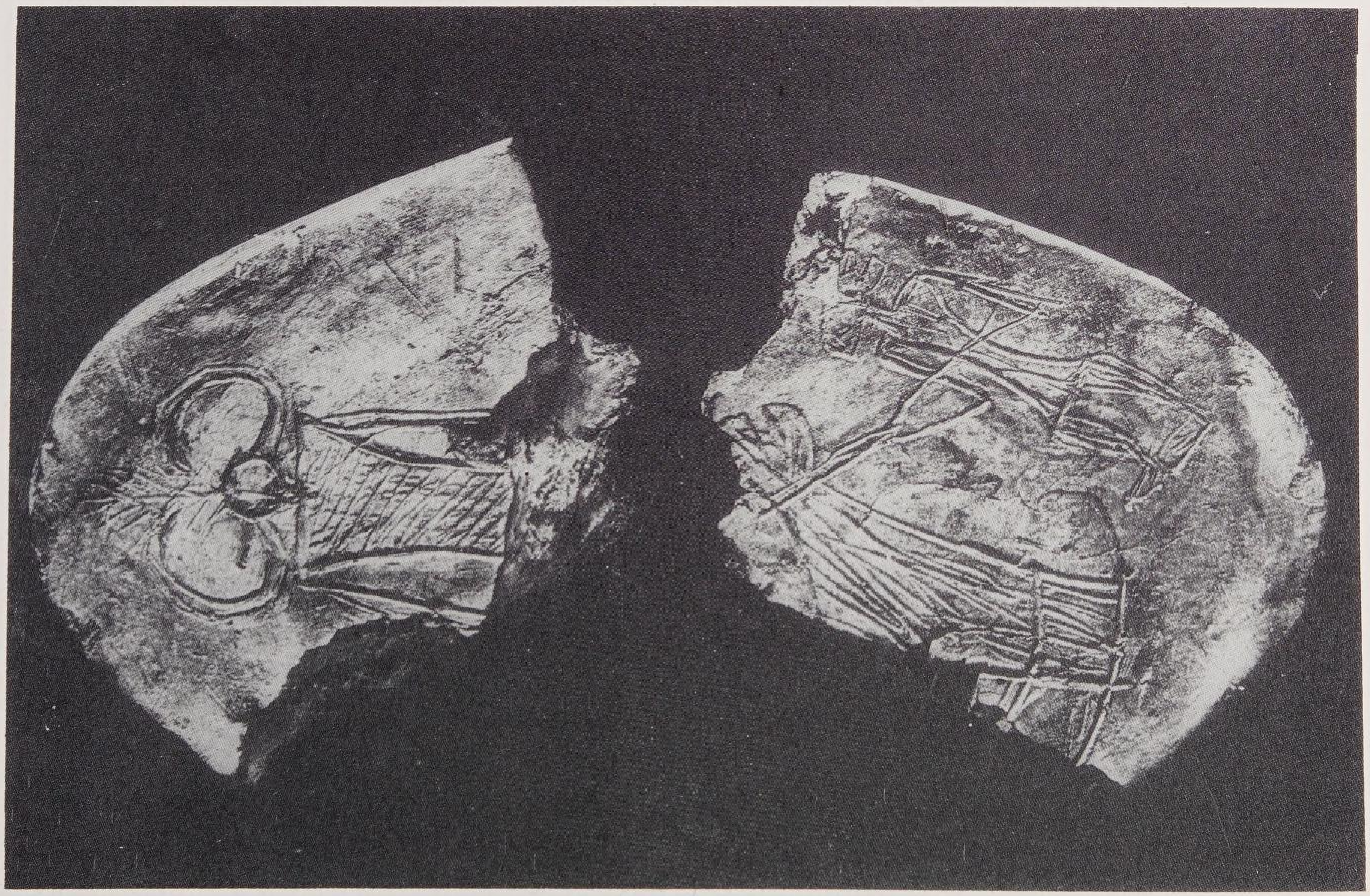
Pl. 38.1. A "fire-altar" at Kalibangan with terracotta cakes and a cylinder or vertical brick (Courtesy, Archaeological Survey of India).



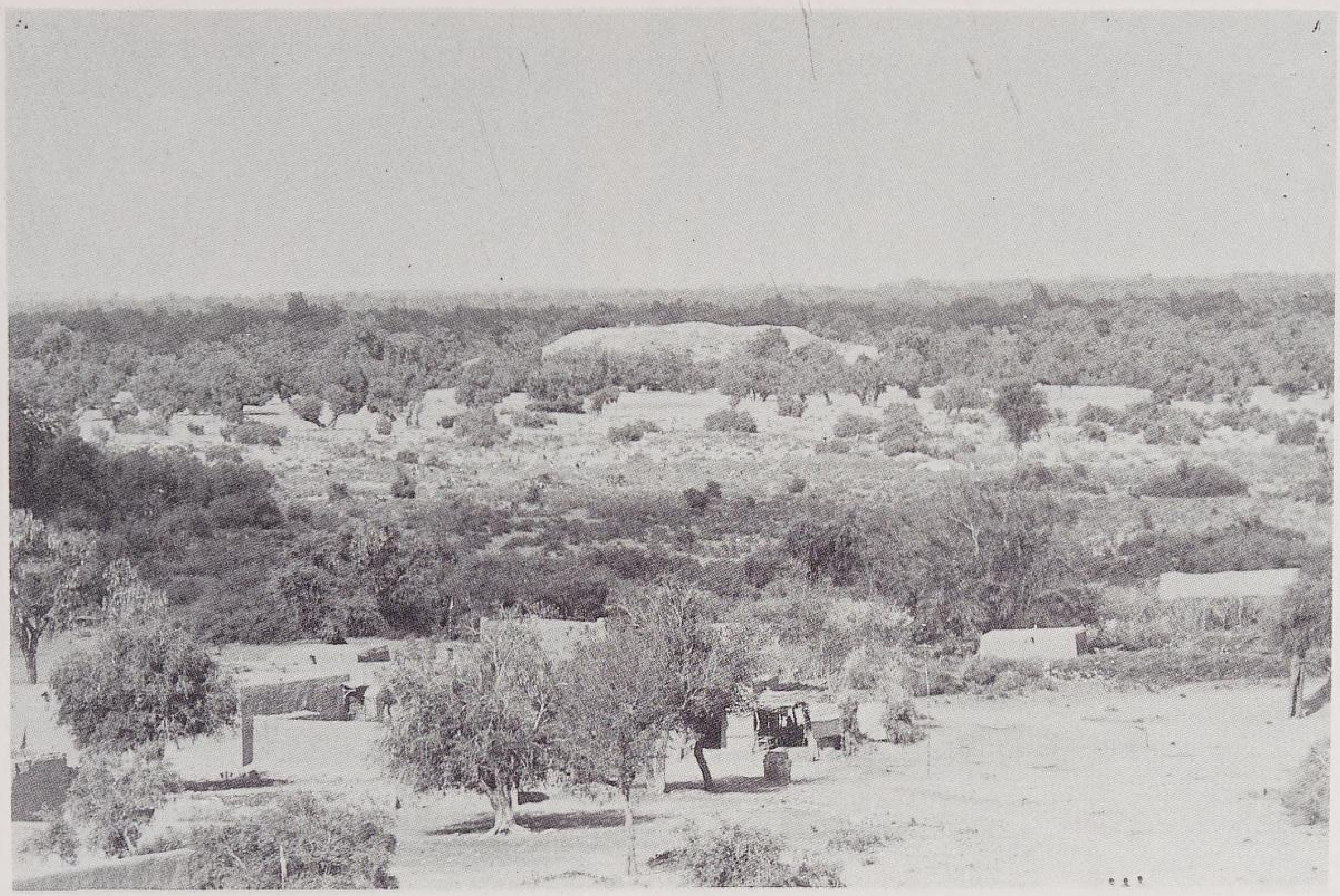
Pl. 38.2. An urn-burial from Kalibangan, a Harappan site in Rajasthan. This site shows three types of burials: urns, inhumation and pot burials (Courtesy, Archaeological Survey of India).



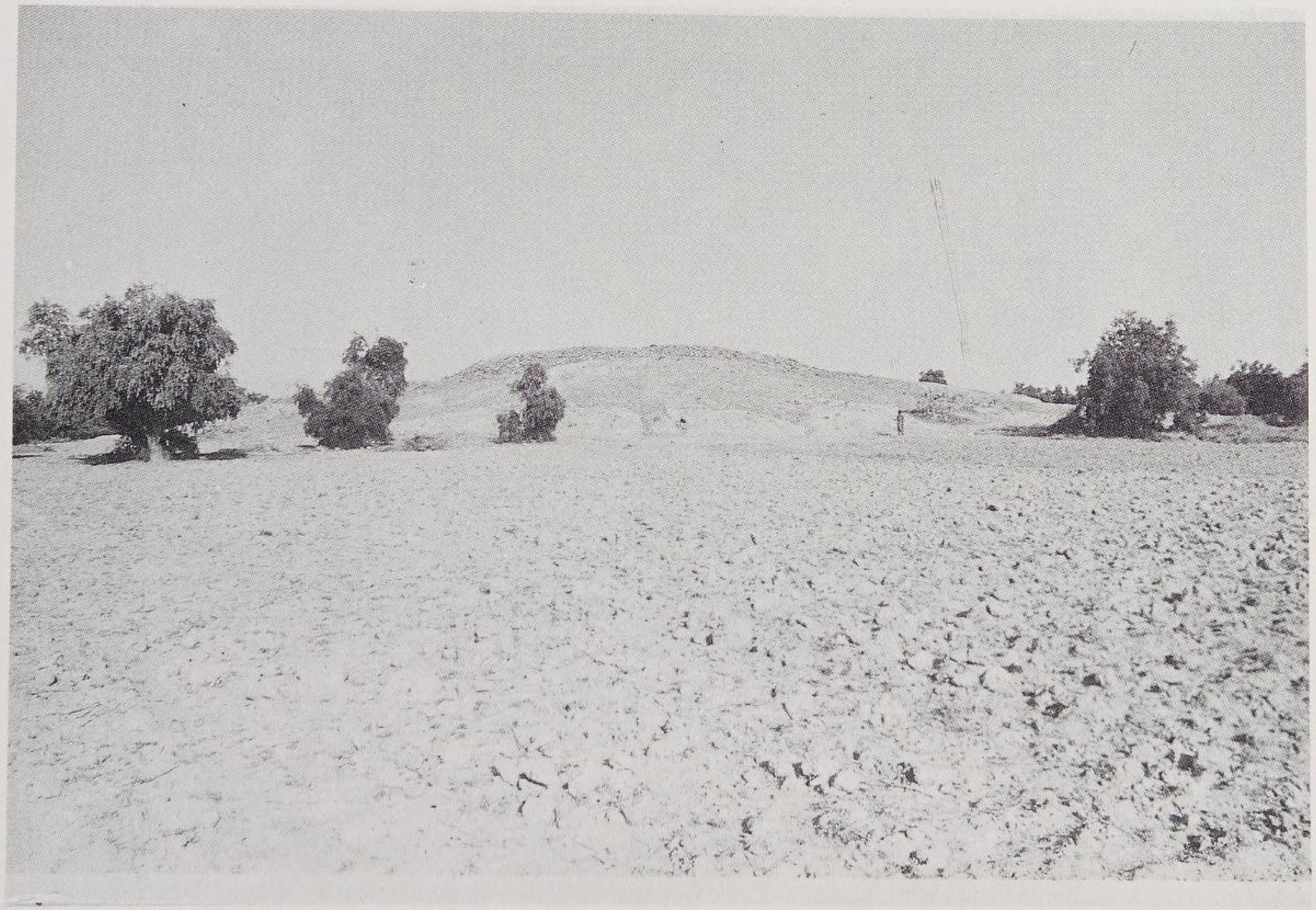
Pl. 38.3. A seal from Mohenjodaro showing a seated figure in a yogic pose, probably ithyphallic, with a horned dress, three-faced, surrounded by animals, it has been identified with *Siva* or *Mahisa* (Seal no. M-304, in *Corpus of Indus Seals*, vol.1, Memoirs of Archaeological Survey of India, No. 86, Edited by J.P. Joshi and Asko Parpola, 1987, Helsinki).



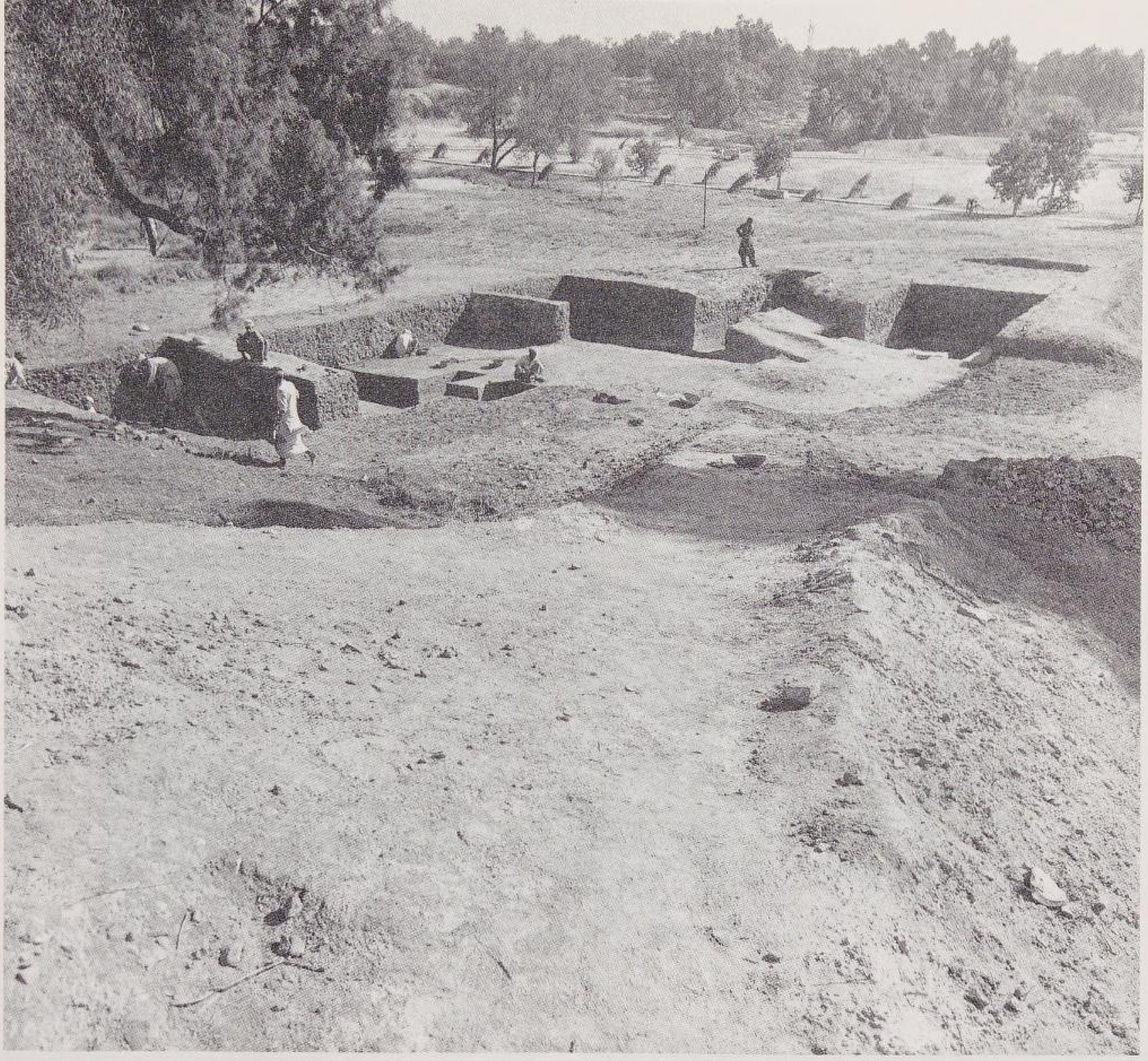
Pl. 38.4. A terracotta cake from Kalibangan showing both obverse and reverse of the same object. On the top is a horned deity (reminding one of the proto-Siva seal), and at the bottom is an animal being dragged by a human probably for sacrifice(?) (Courtesy: Archaeological Survey of India).



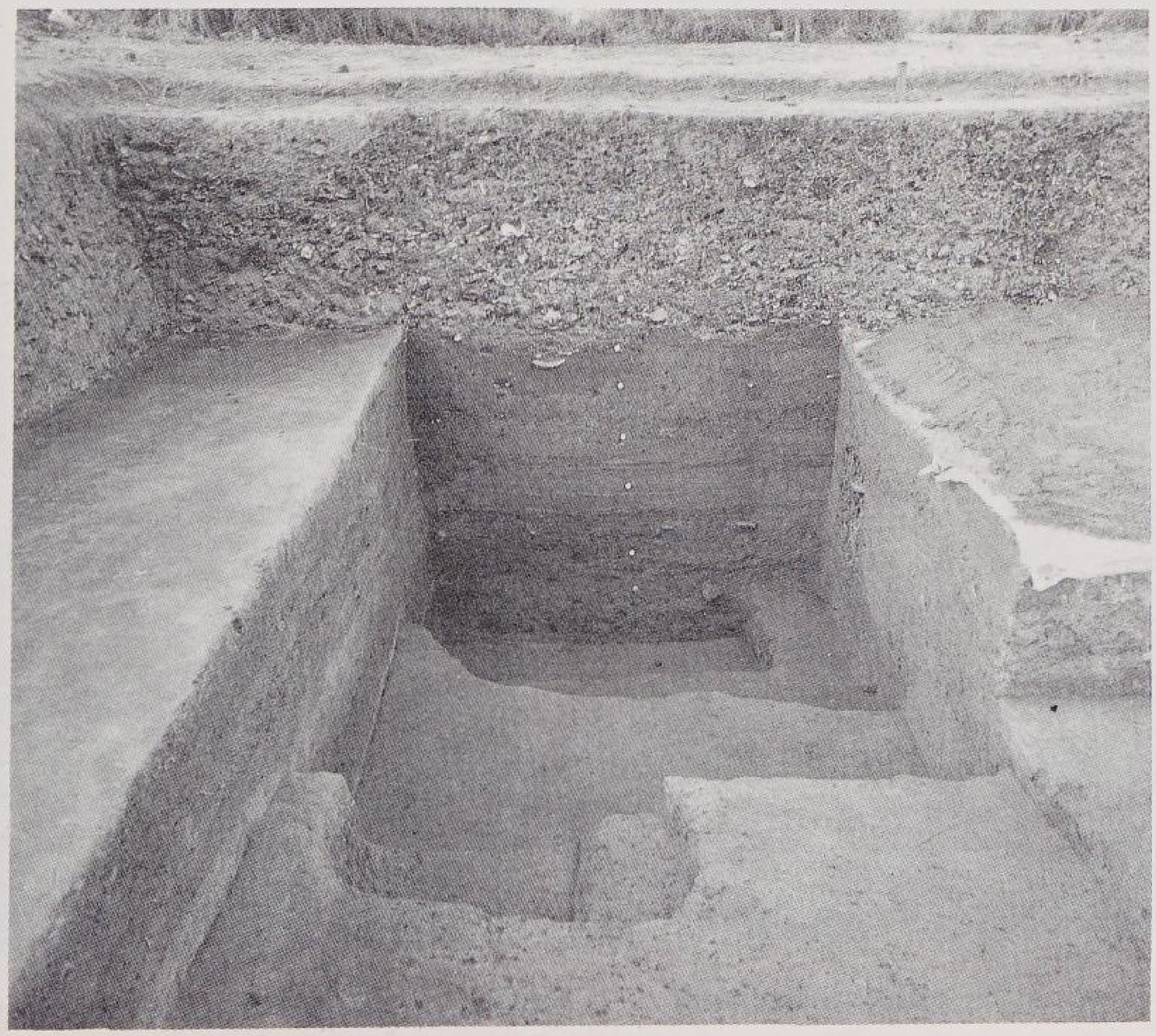
Pl. 39.1. Ghazi Shah.



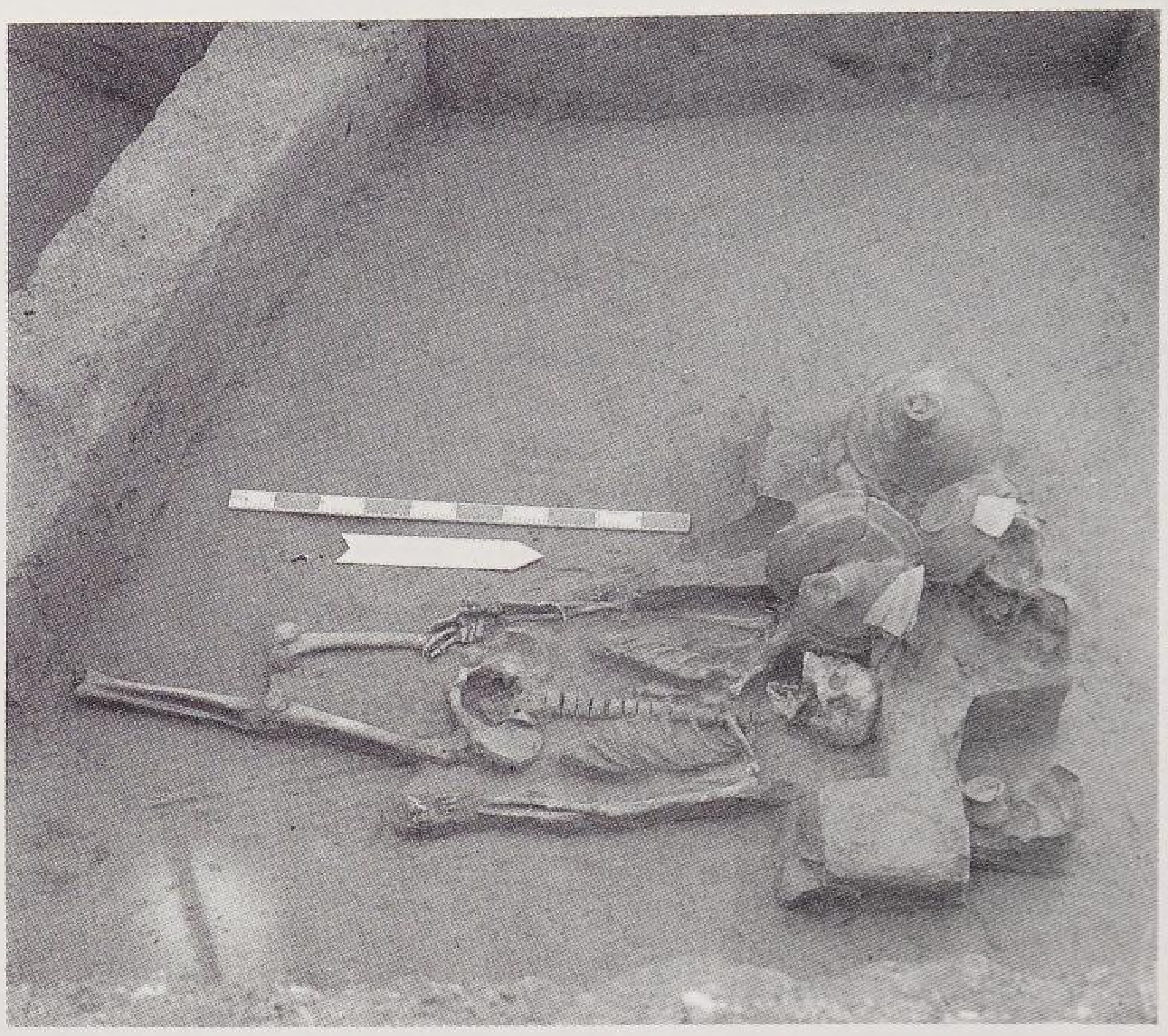
Pl. 39.2. Ghazi Shah.



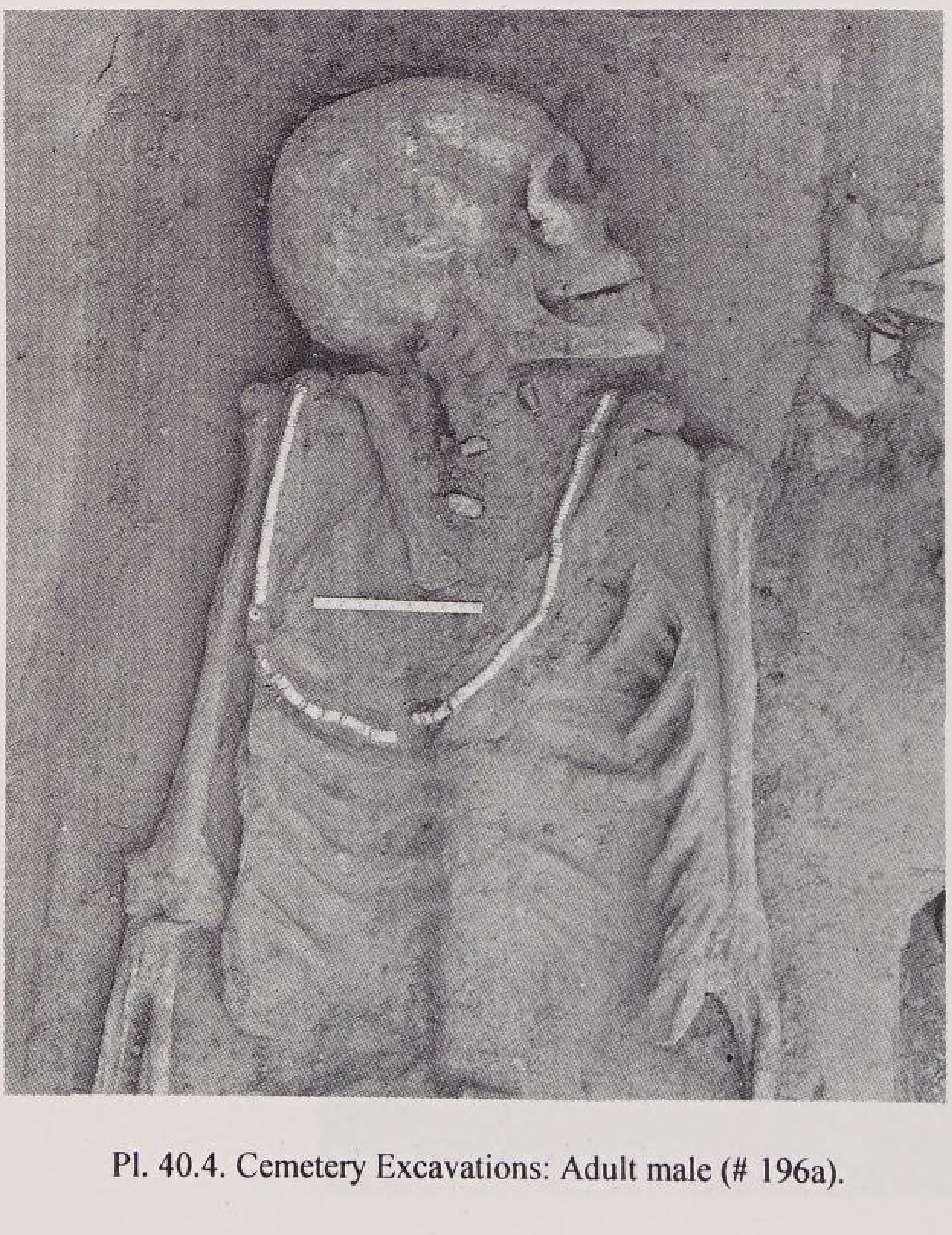
P. 40.1. Cemetery Area, General at start of Excavations in 1987.



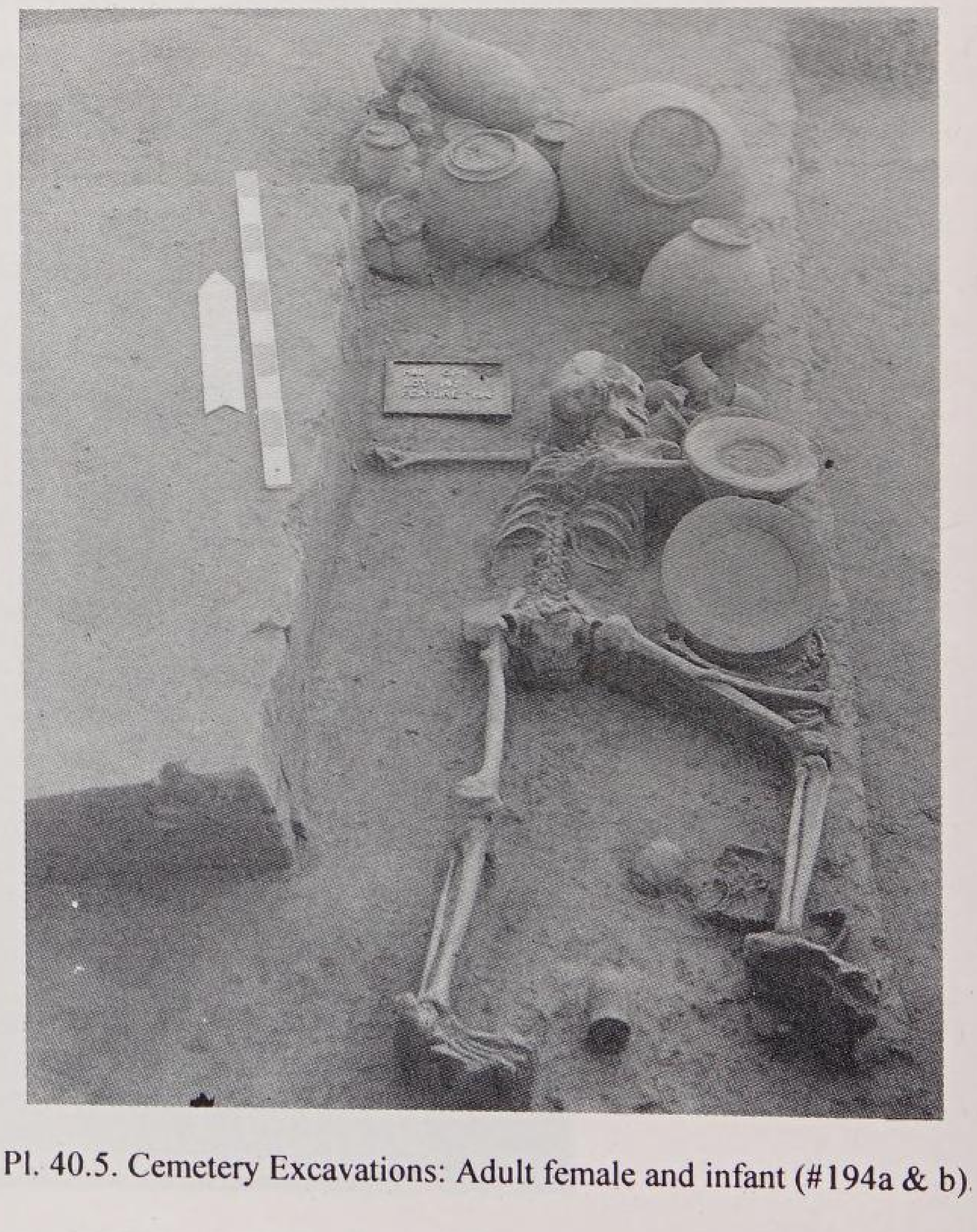
Pl. 40.2. Cemetery Area: Debris layer of mostly pottery, covering cemetery.



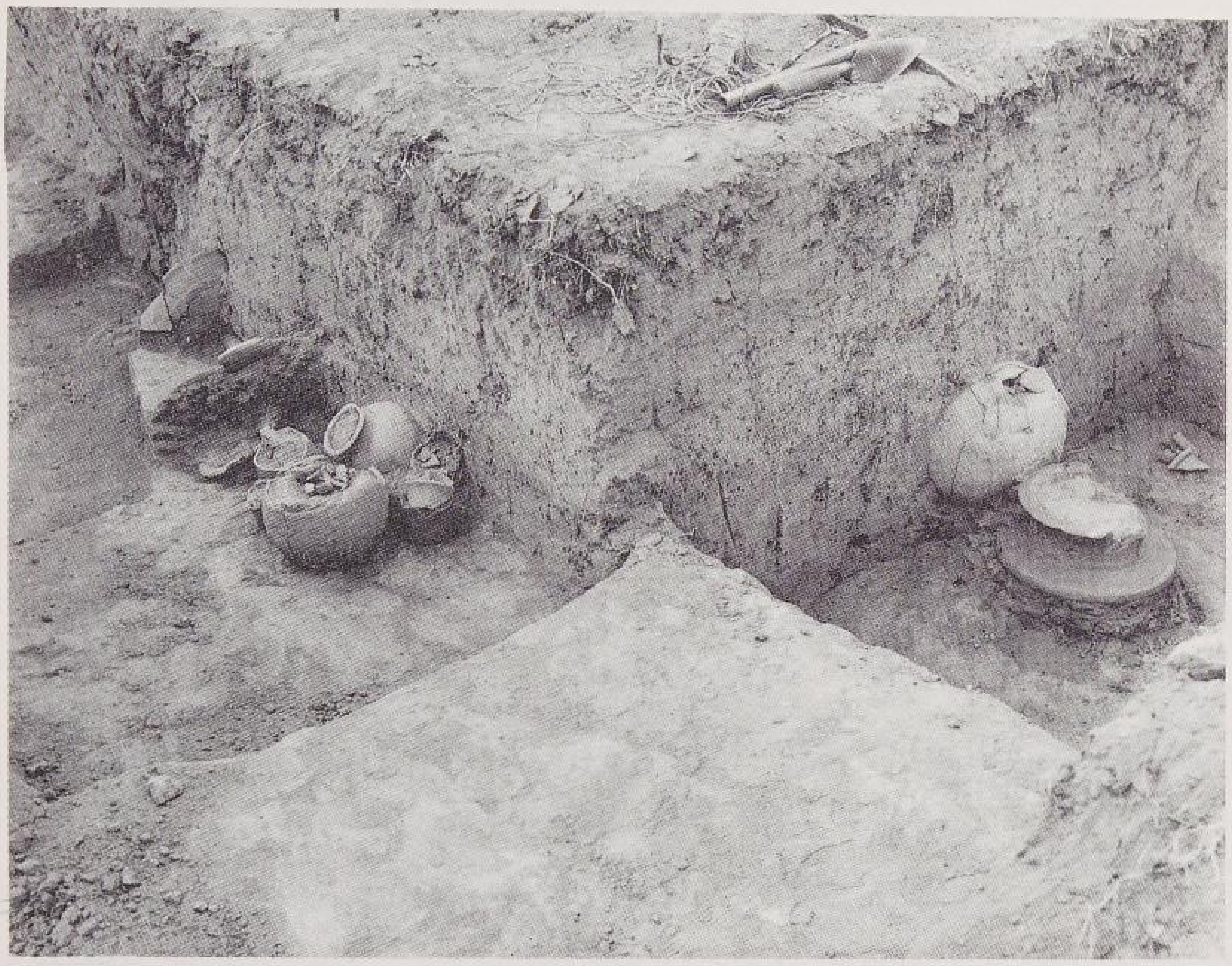
Pl. 40.3. Cemetery Excavations: Adult male (# 147a).



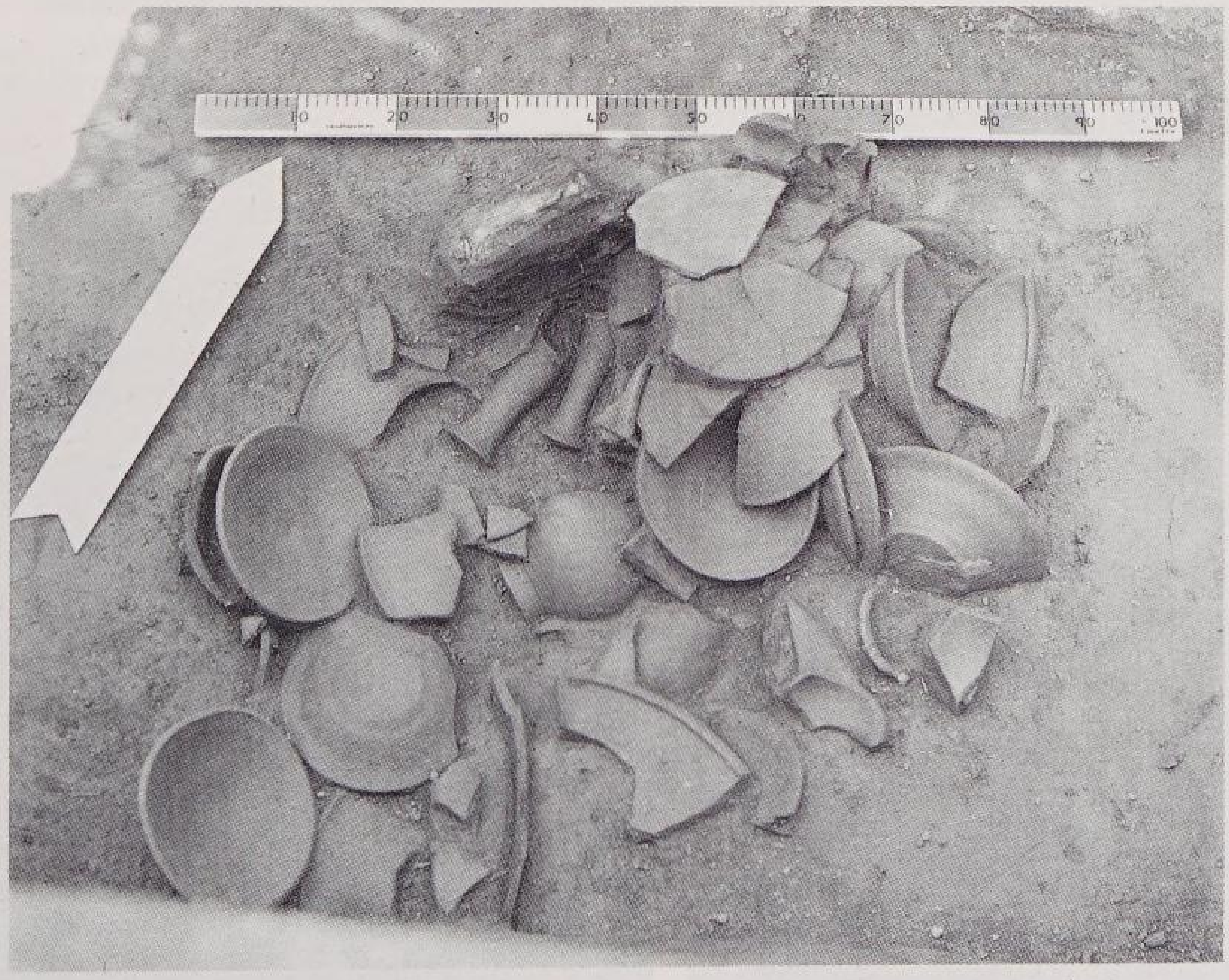
Pl. 40.4. Cemetery Excavations: Adult male (# 196a).



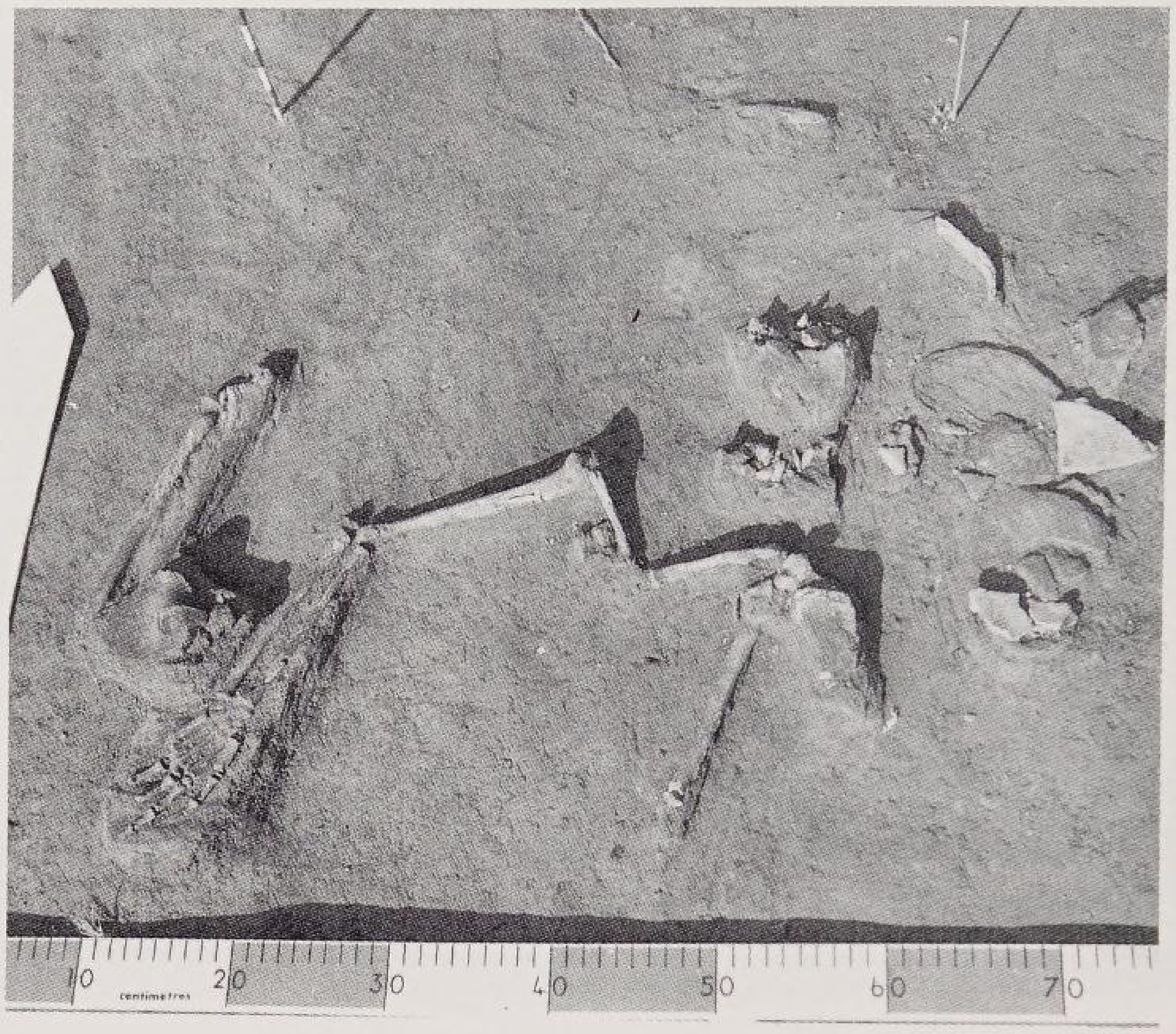
Pl. 40.5. Cemetery Excavations: Adult female and infant (#194a & b).



Pl. 40.6. Cemetery excavations: Eroded burials with only pottery.



Pl. 40.7. Cemetery excavations: Pottery from an eroded burial.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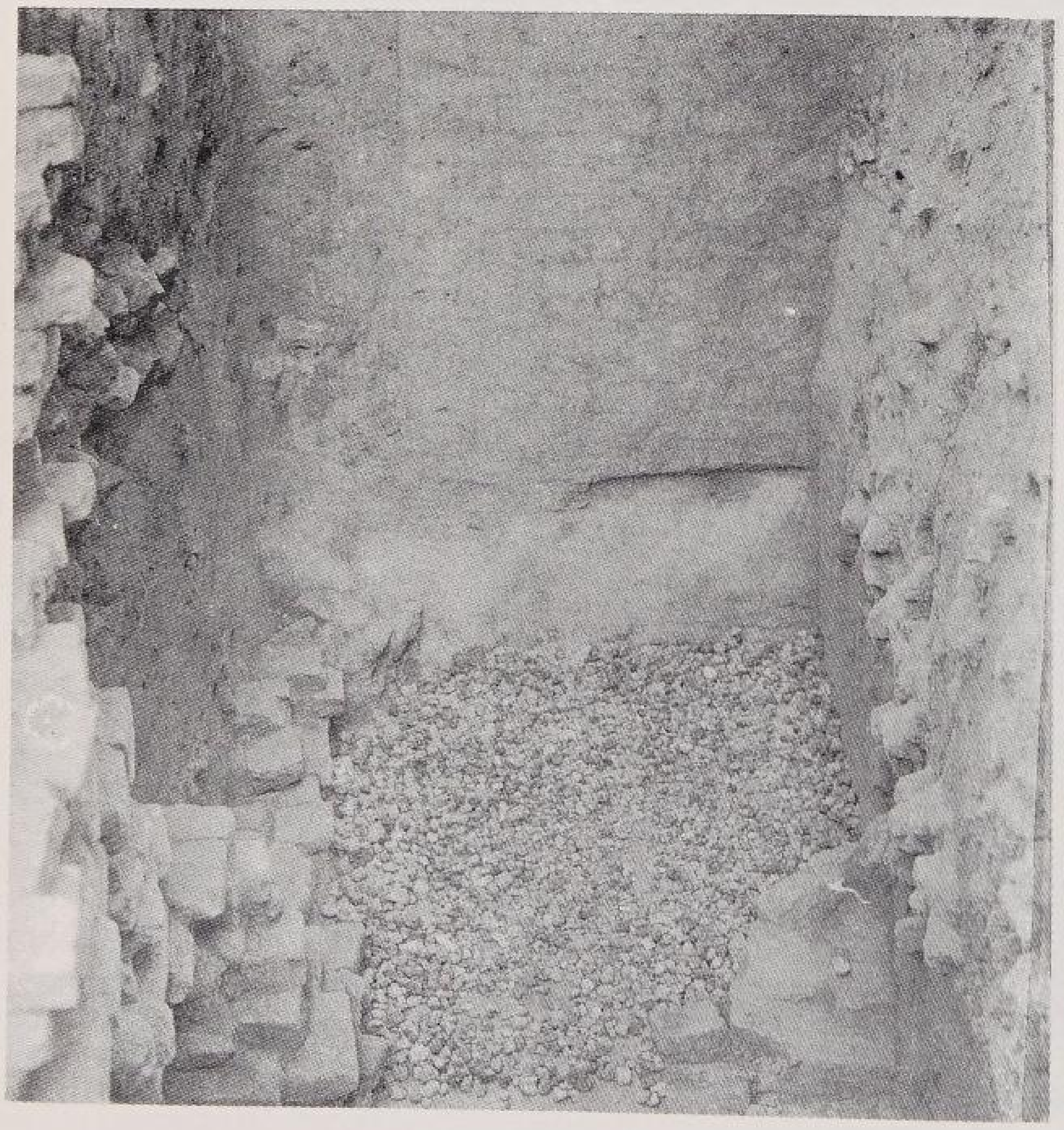
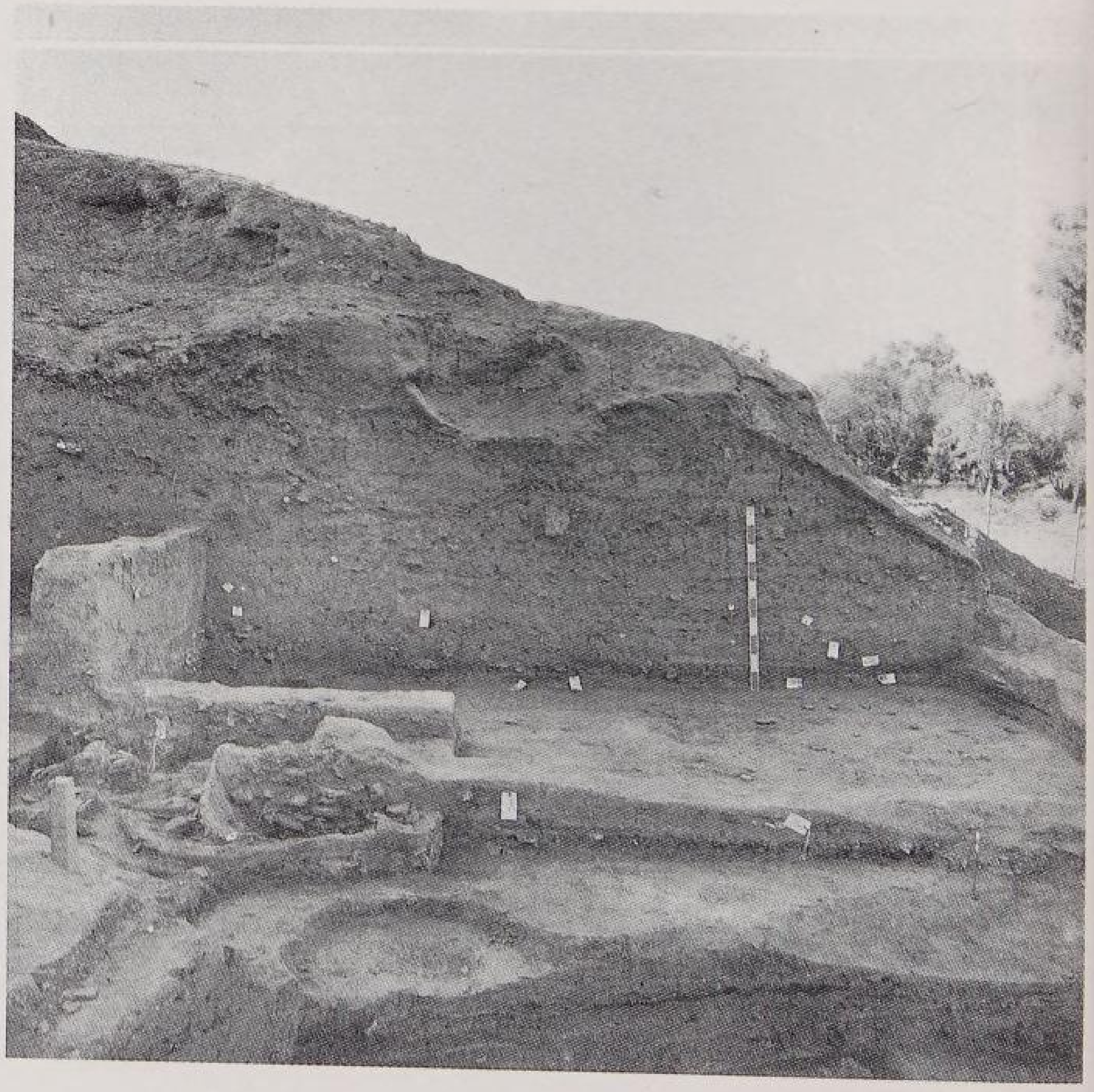
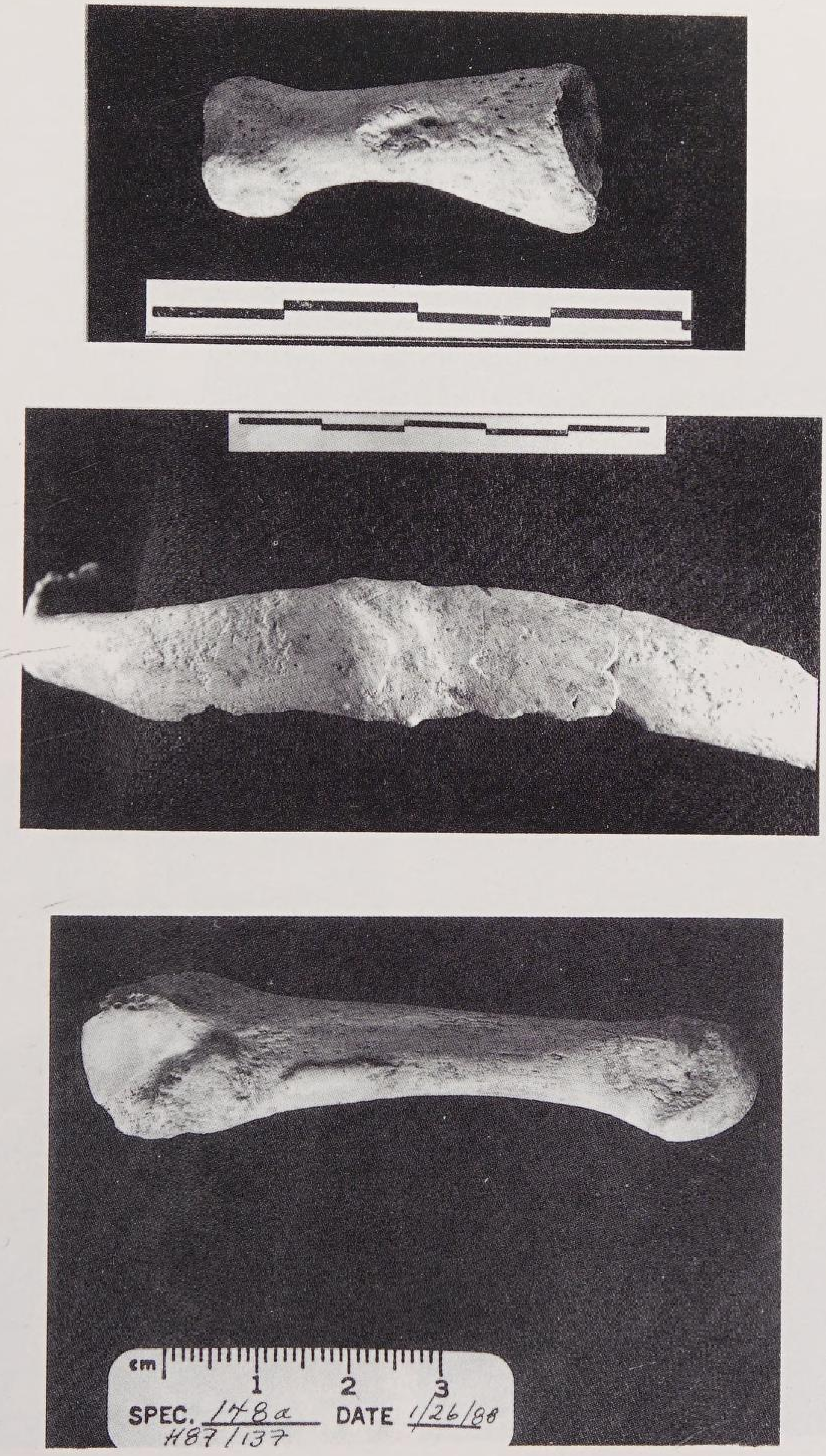
Pl. 40.8. Cemetery excavations: Disarticulated bones from an eroded burial.



Pl. 40.12. Mound E, North-west corner: Harappan (Period III) Platforms and fired clay nodule foundation.



Pl. 40.13. Mound E, North-west corner: Small Period III kiln.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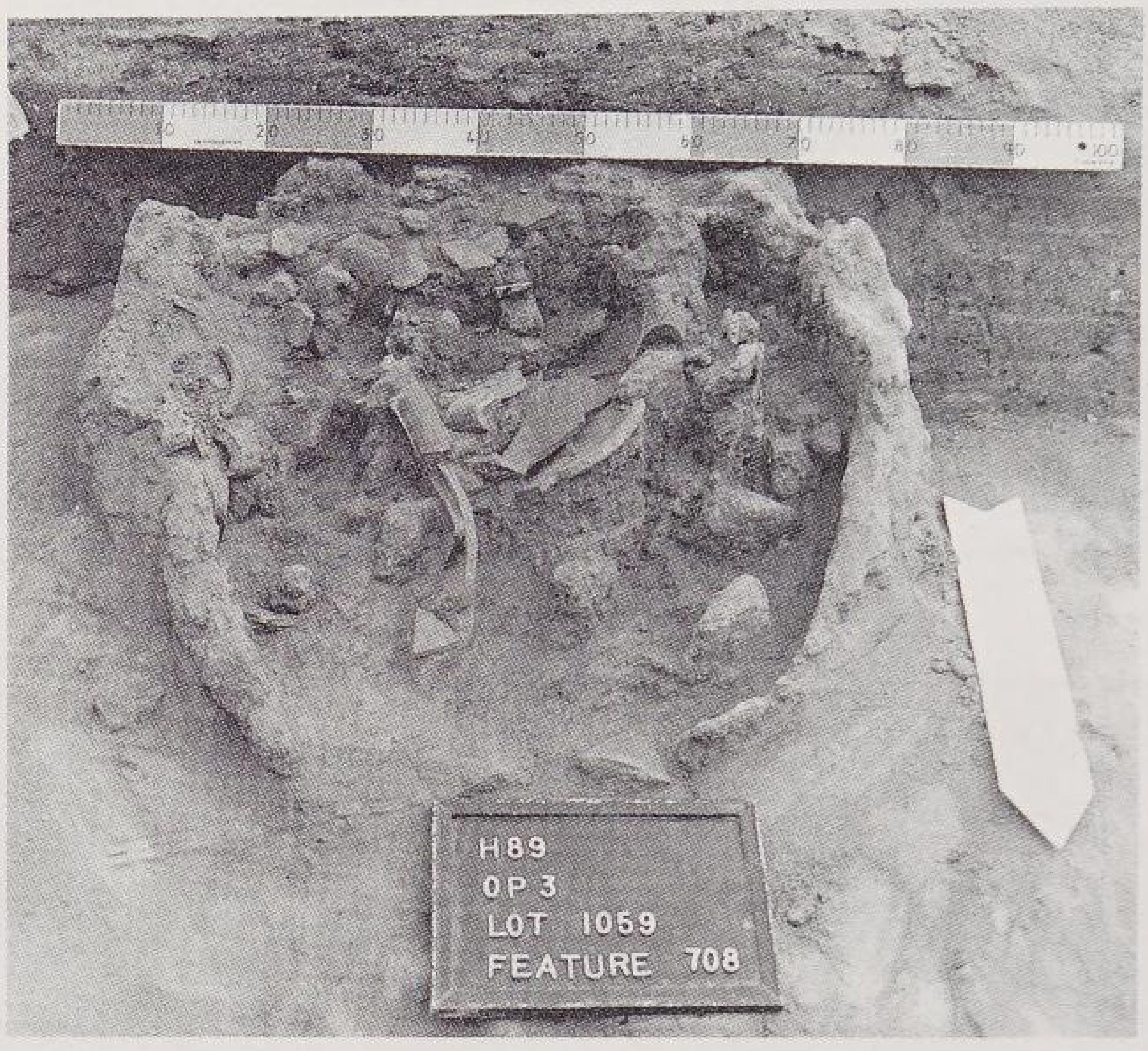
SPEC. 148a DATE 1/26/88
H87/137

Pl. 40.9. 40.10, 40.11. Cemetery excavations: Bone pathologies.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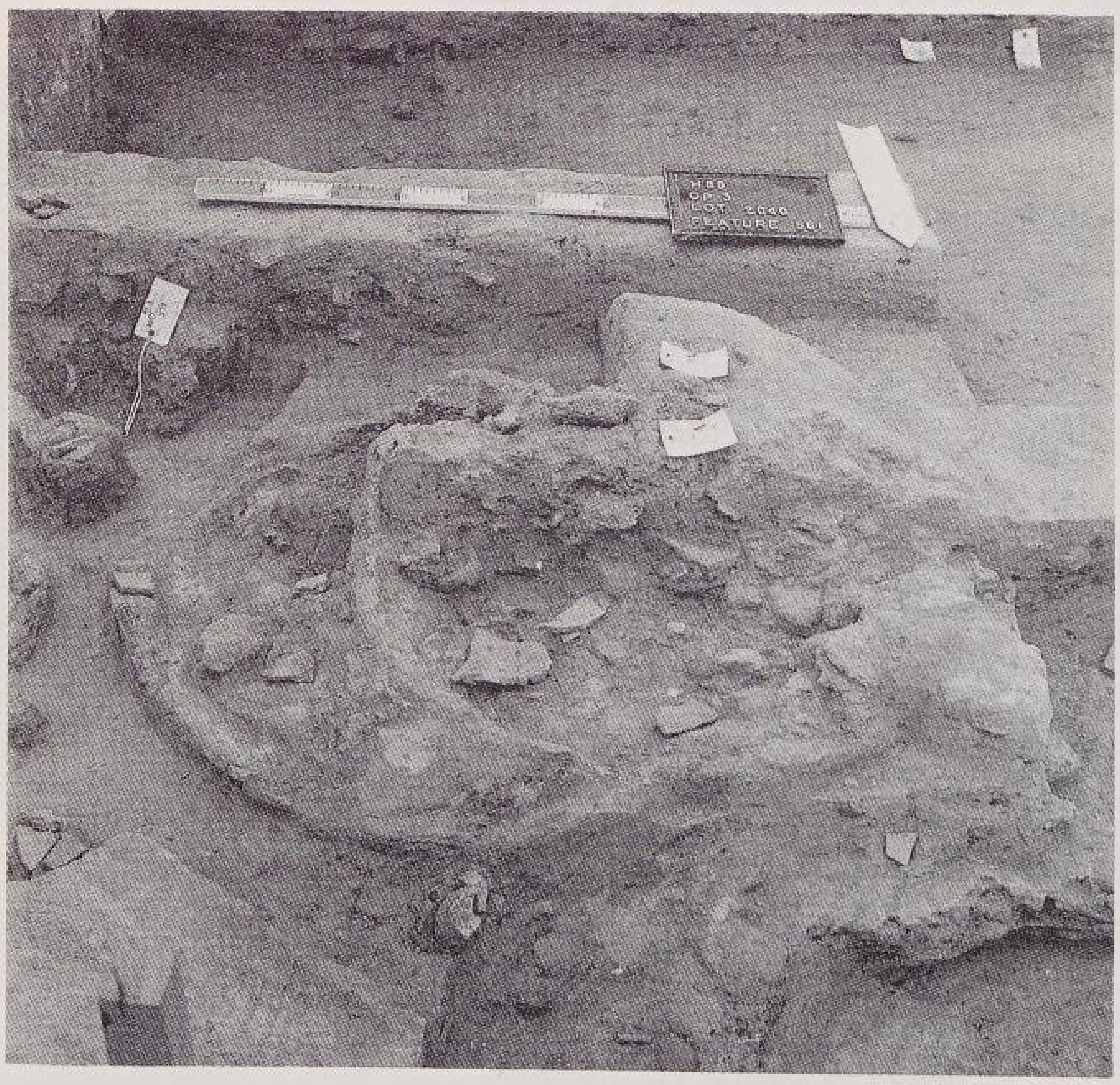
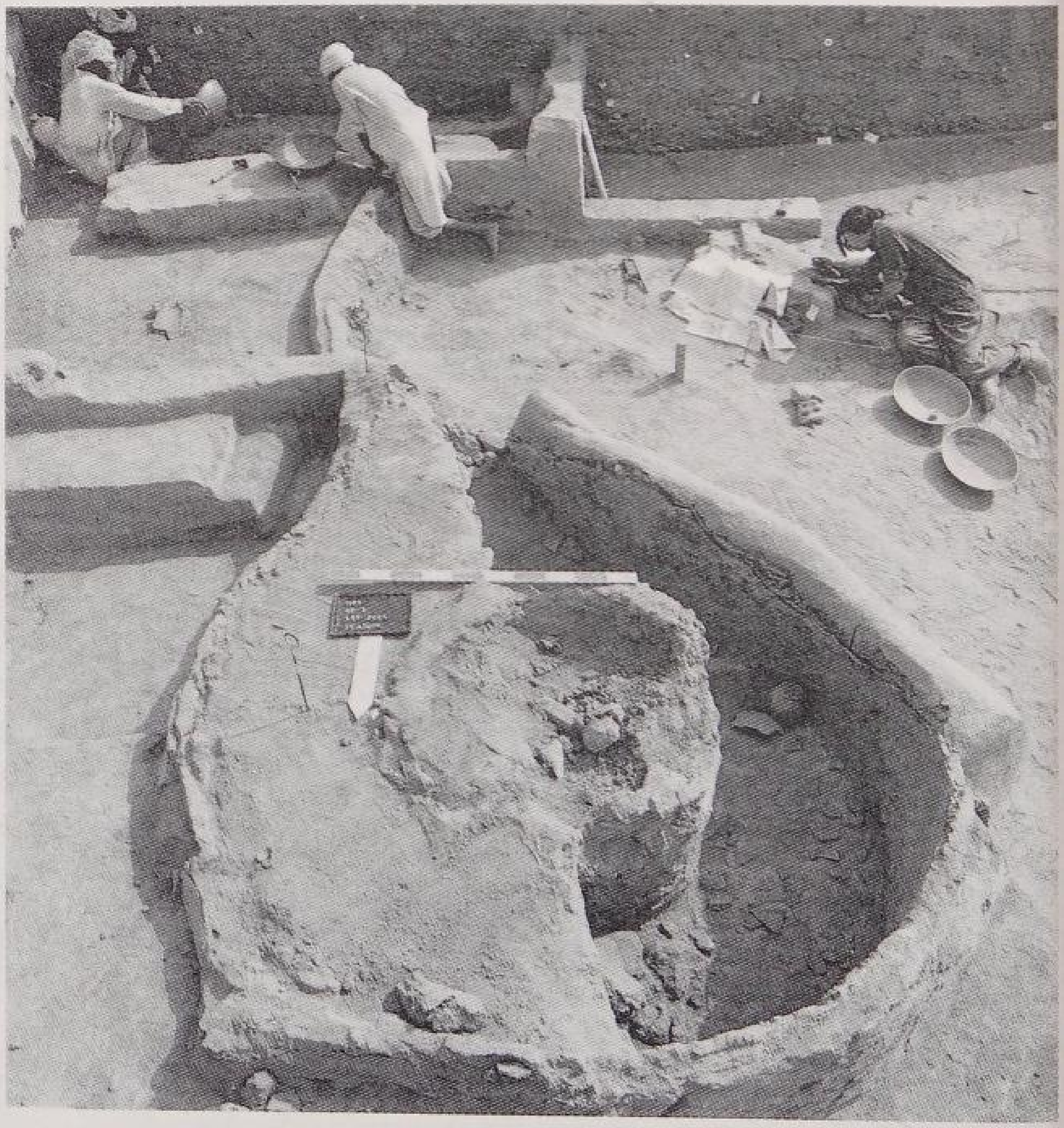
OP 3
LOT 1059
FEATURE 708

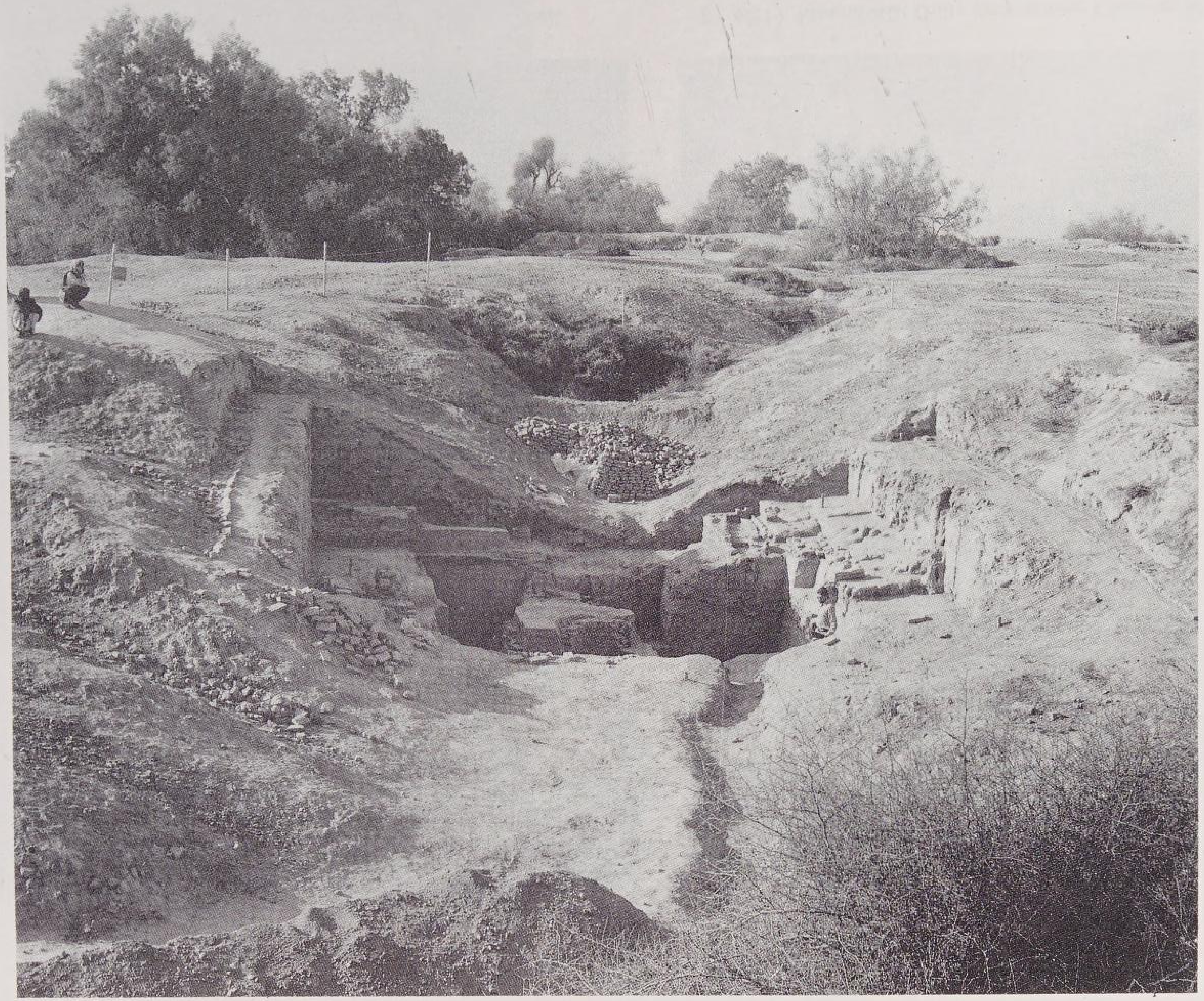
Pl. 40.14. Mound E, North-west corner: Early kiln.



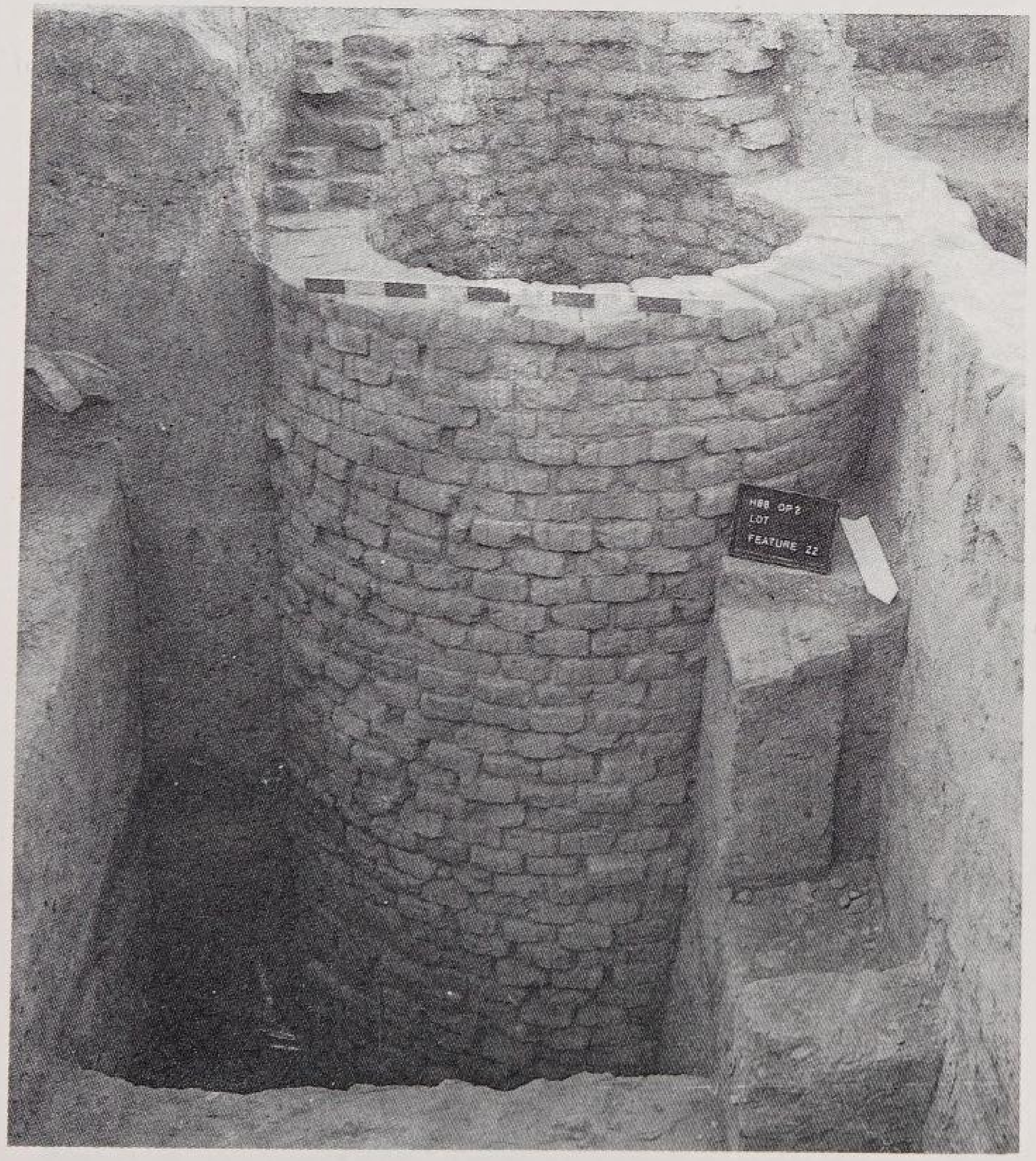
Pl. 40.15. Mound E, North-west corner: Small Period III kiln.



Pl. 40.16. Mound E, North-west corner: Large Period III kiln.



Pl. 40.17. Mound AB: Northeastern gully excavations.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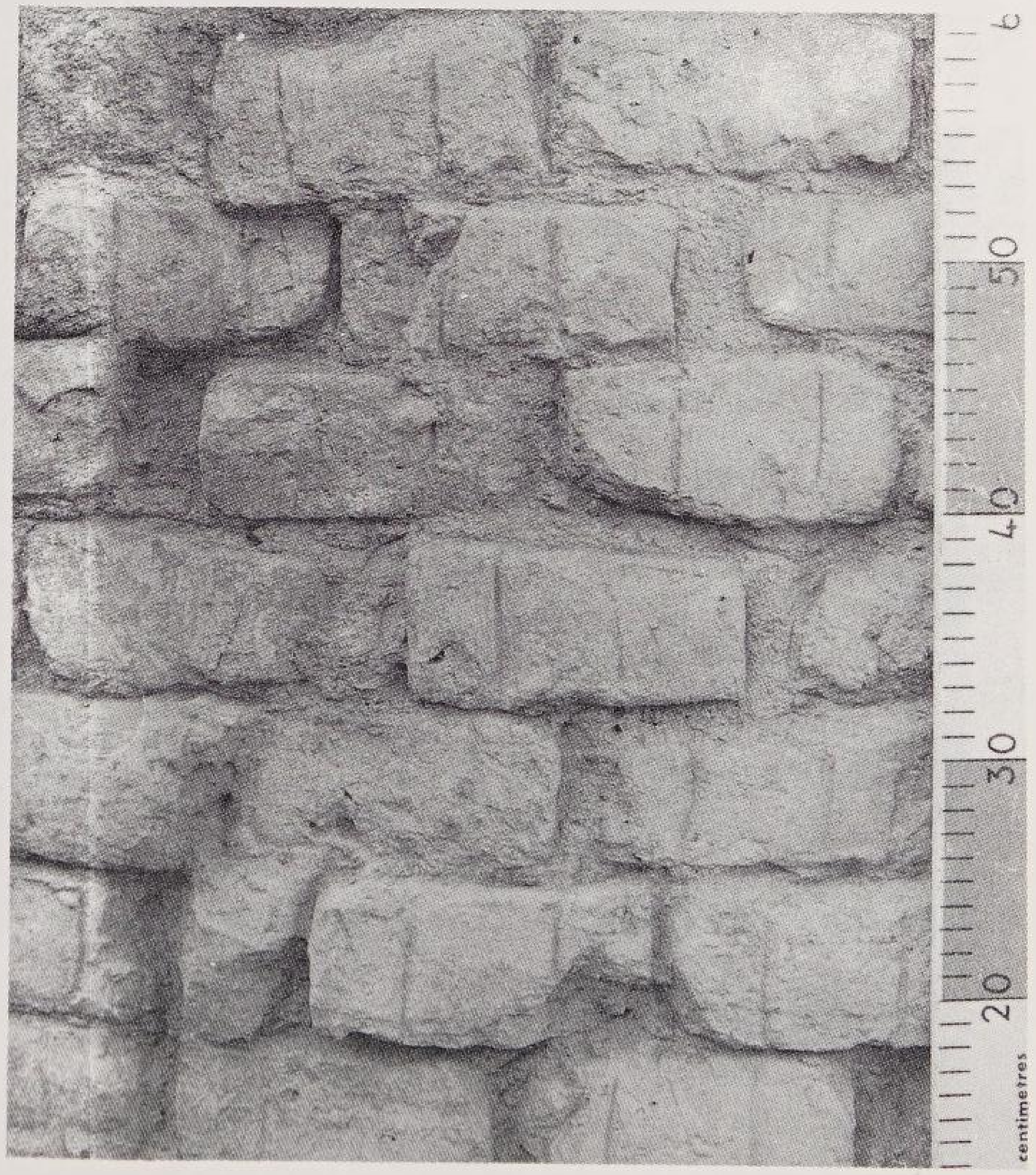
LOT
FEATURE 22

Pl. 40.18. Mound AB: Gully excavations: Exterior section of well.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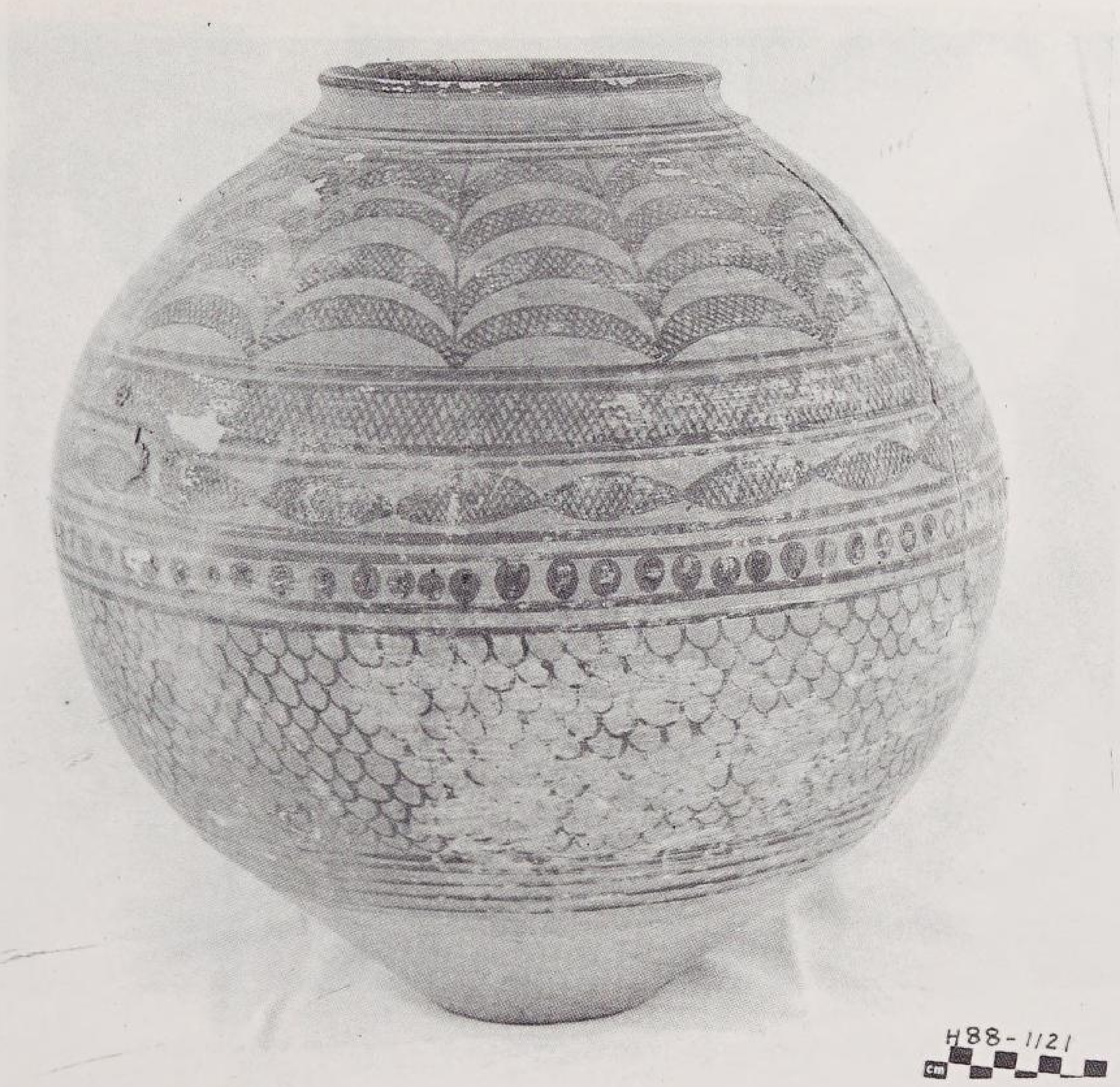
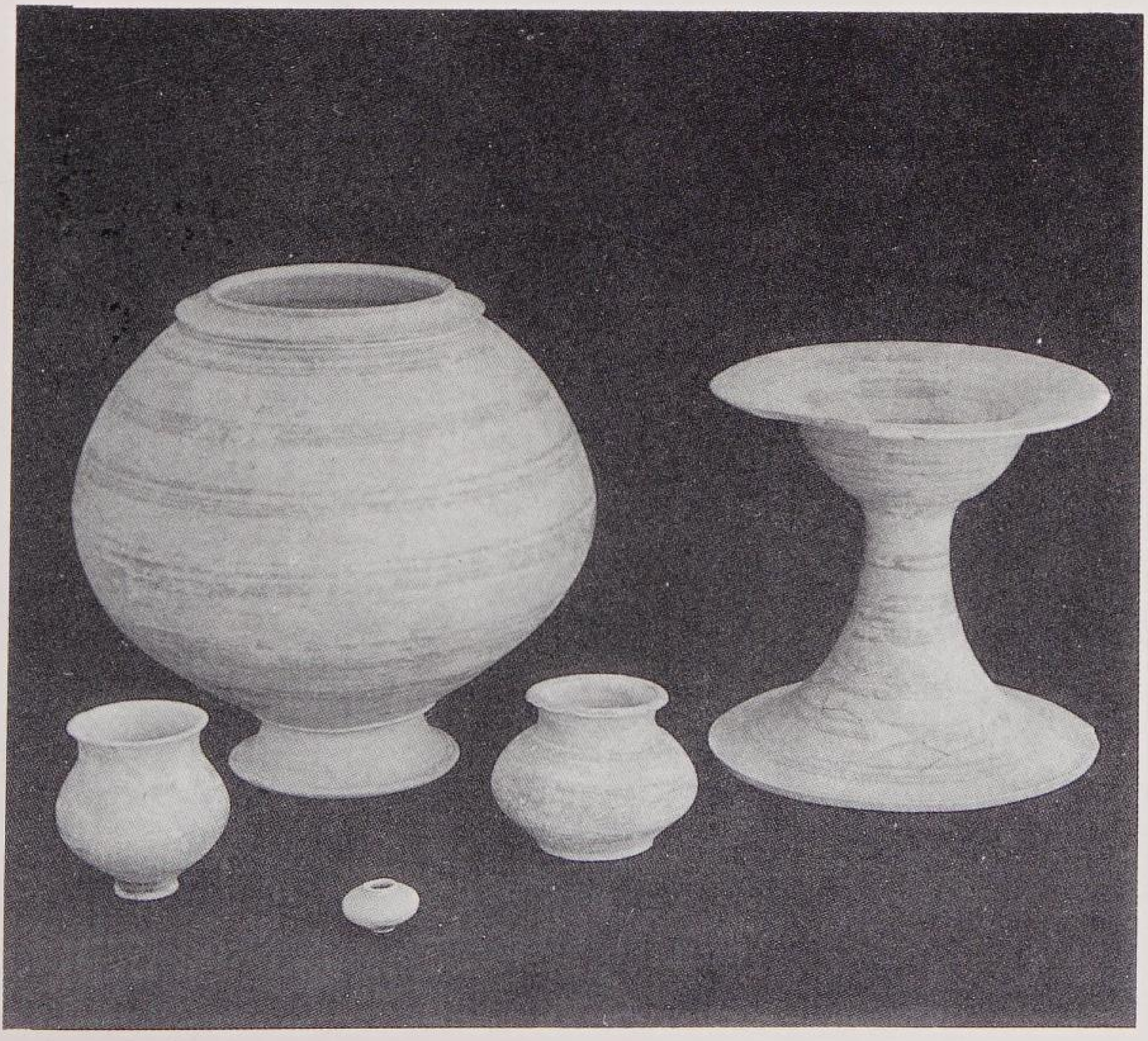
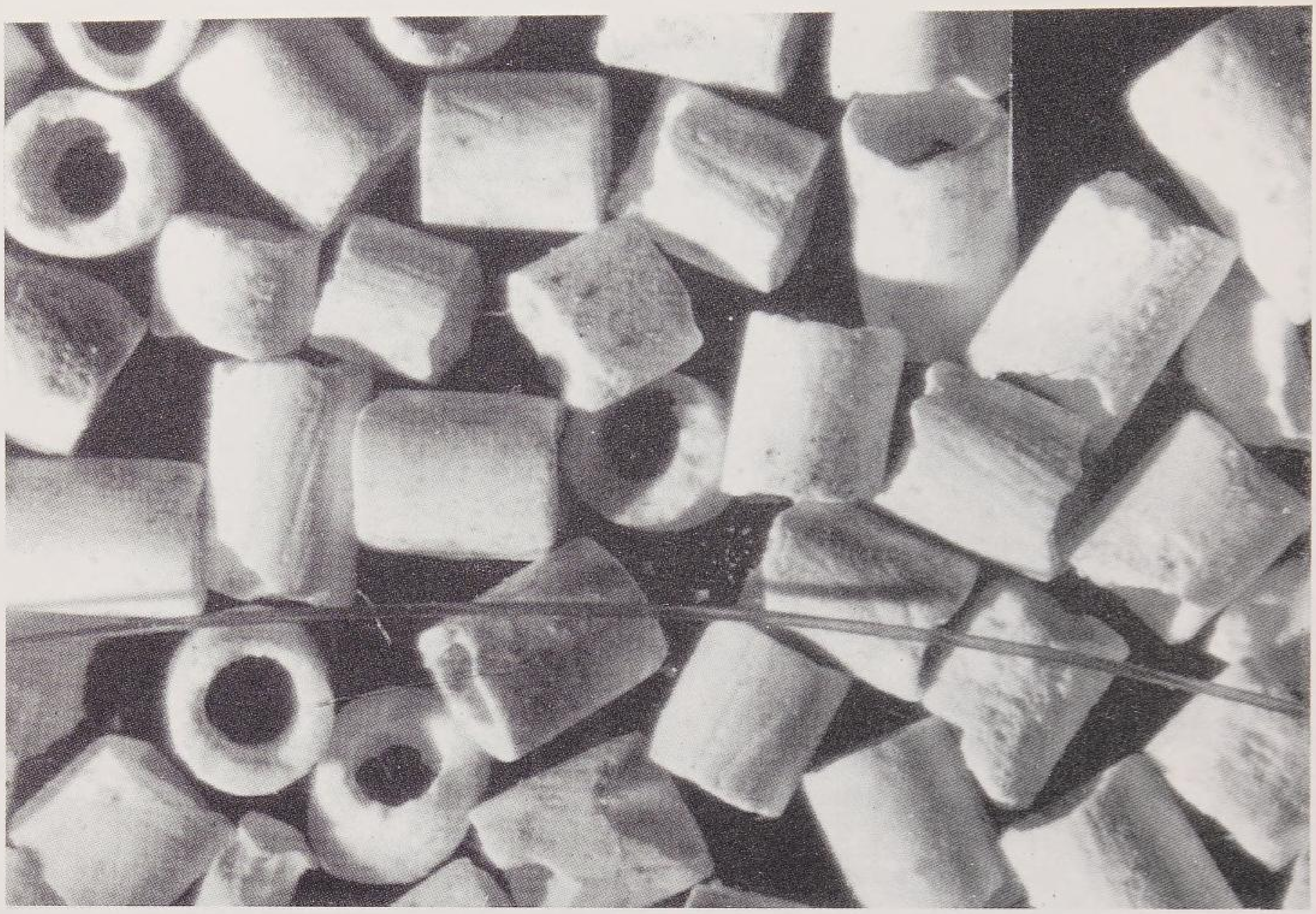
Pl. 40.19. Mound AB: Gully excavations: Close-up of incised well bricks.

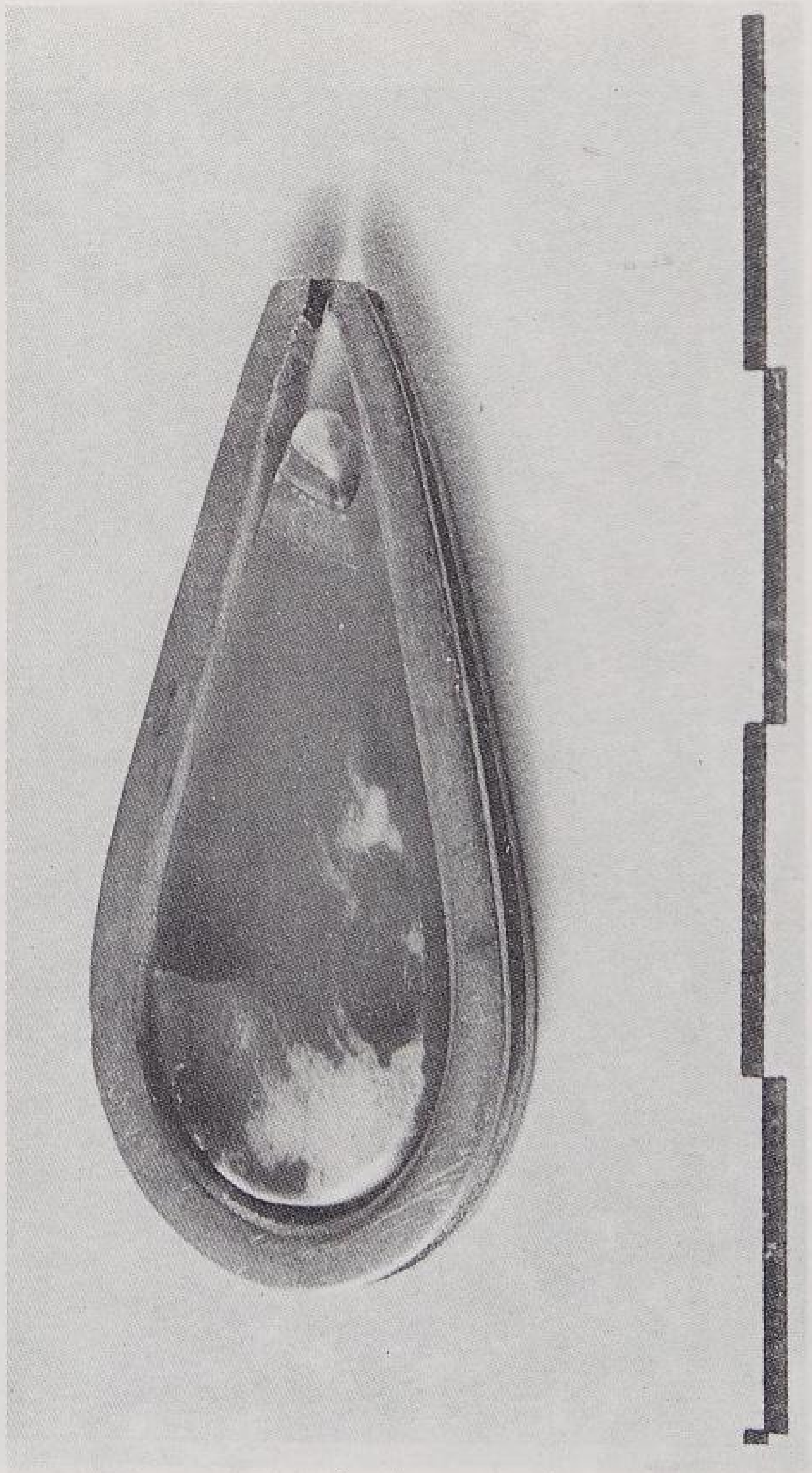




Pl. 40.20, 40.21. Examples of pottery from cemetery excavations.

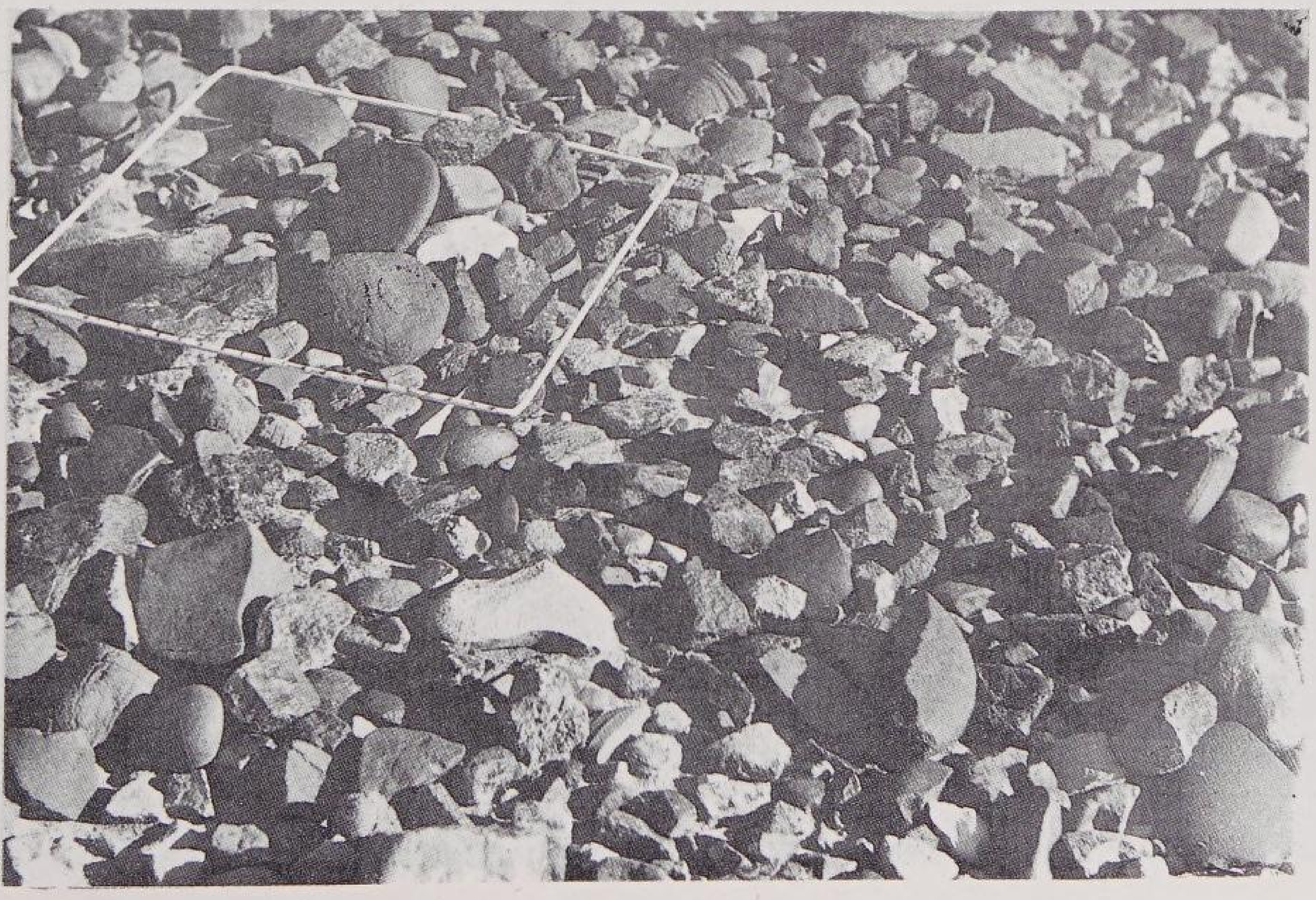


Pl. 40.22. Microscope photograph of microbeads (with human hair).



Pl. 40.23. Carnelian pendant set in gold from Burial

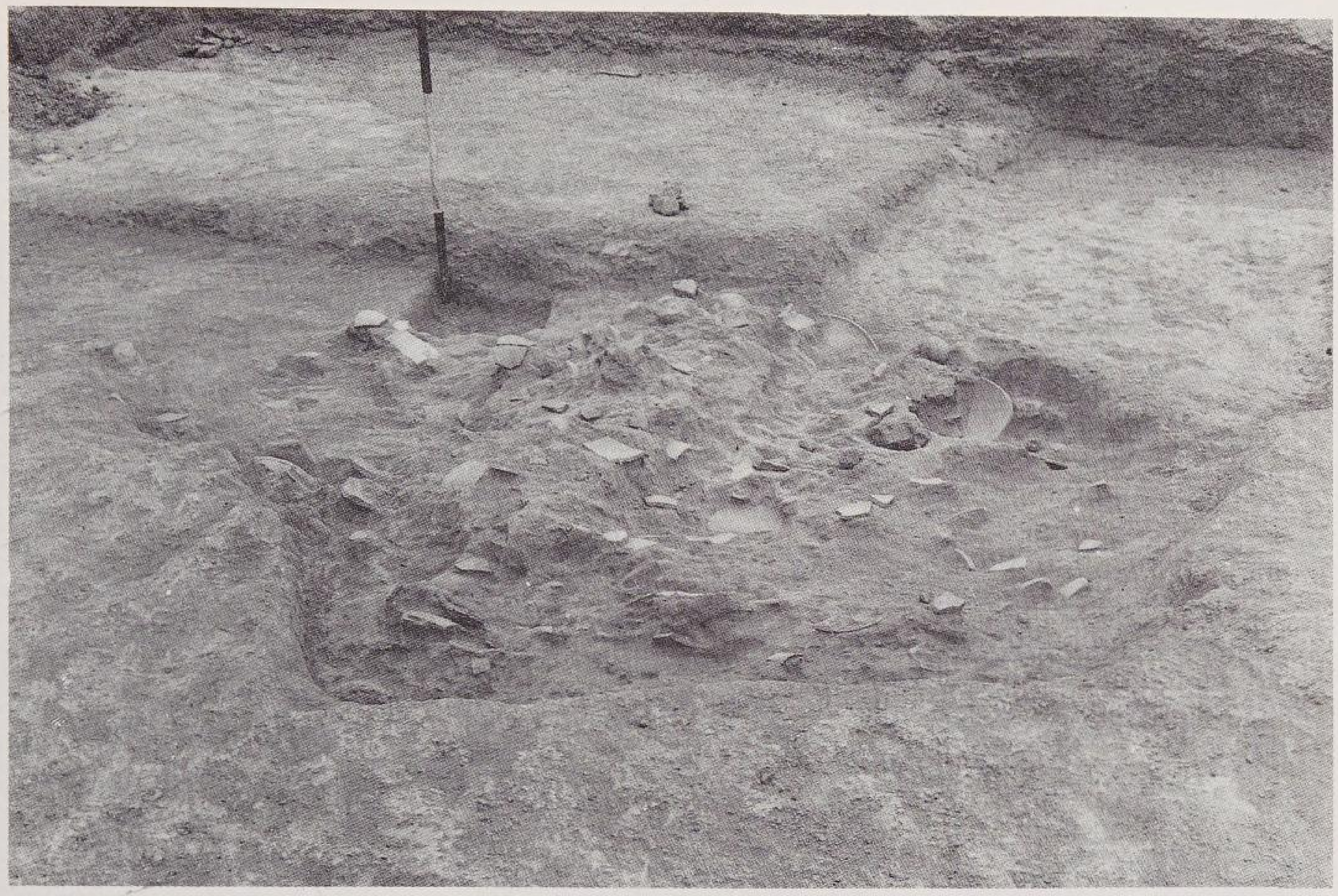
Pl. 41.1. Hunting microliths with a shot-gun.



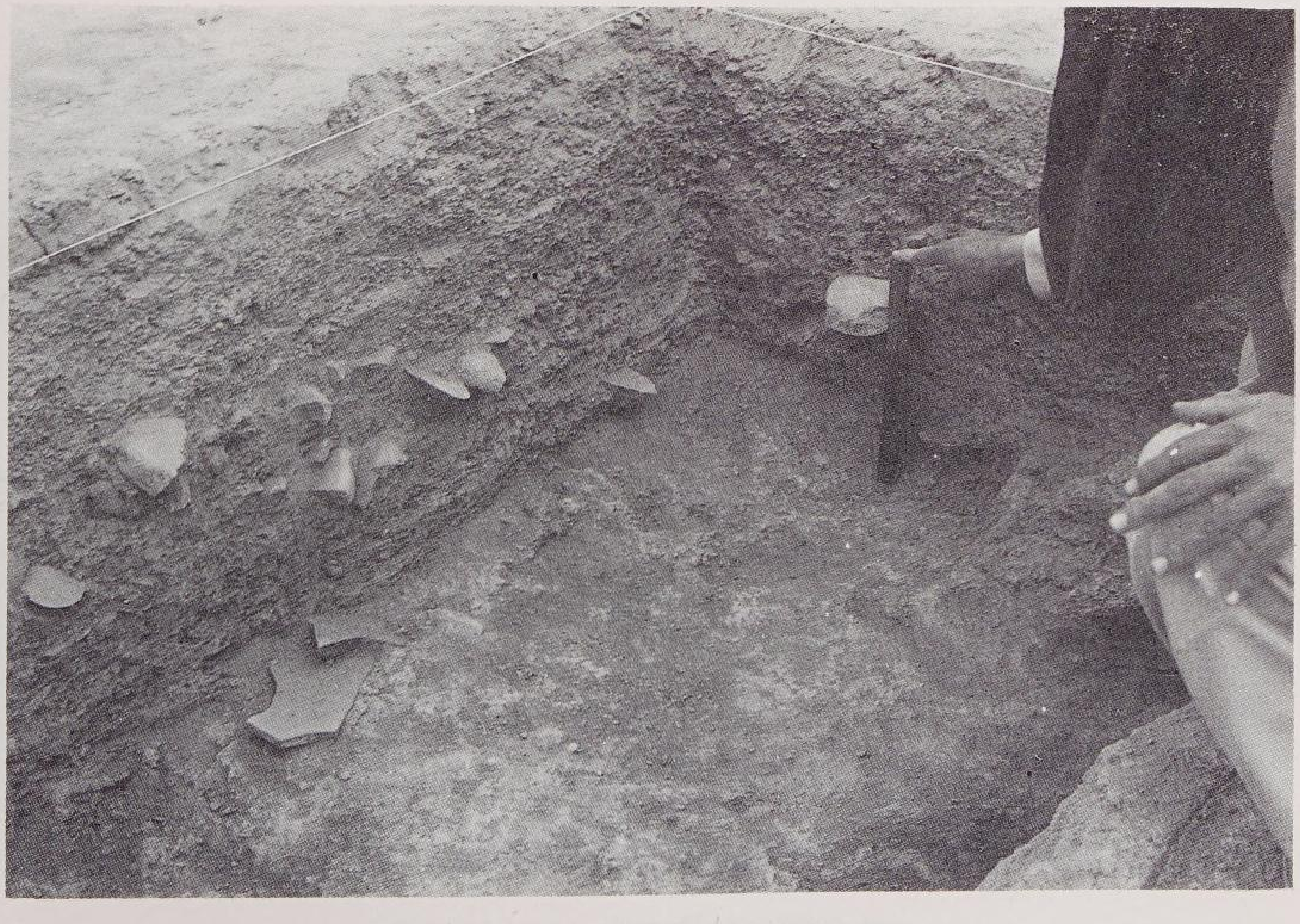
Pl. 41.2. Lewan: Surface before excavation showing, artefacts, debitage, etc.

Pl. 41.3. Lewan: Excavation in progress.

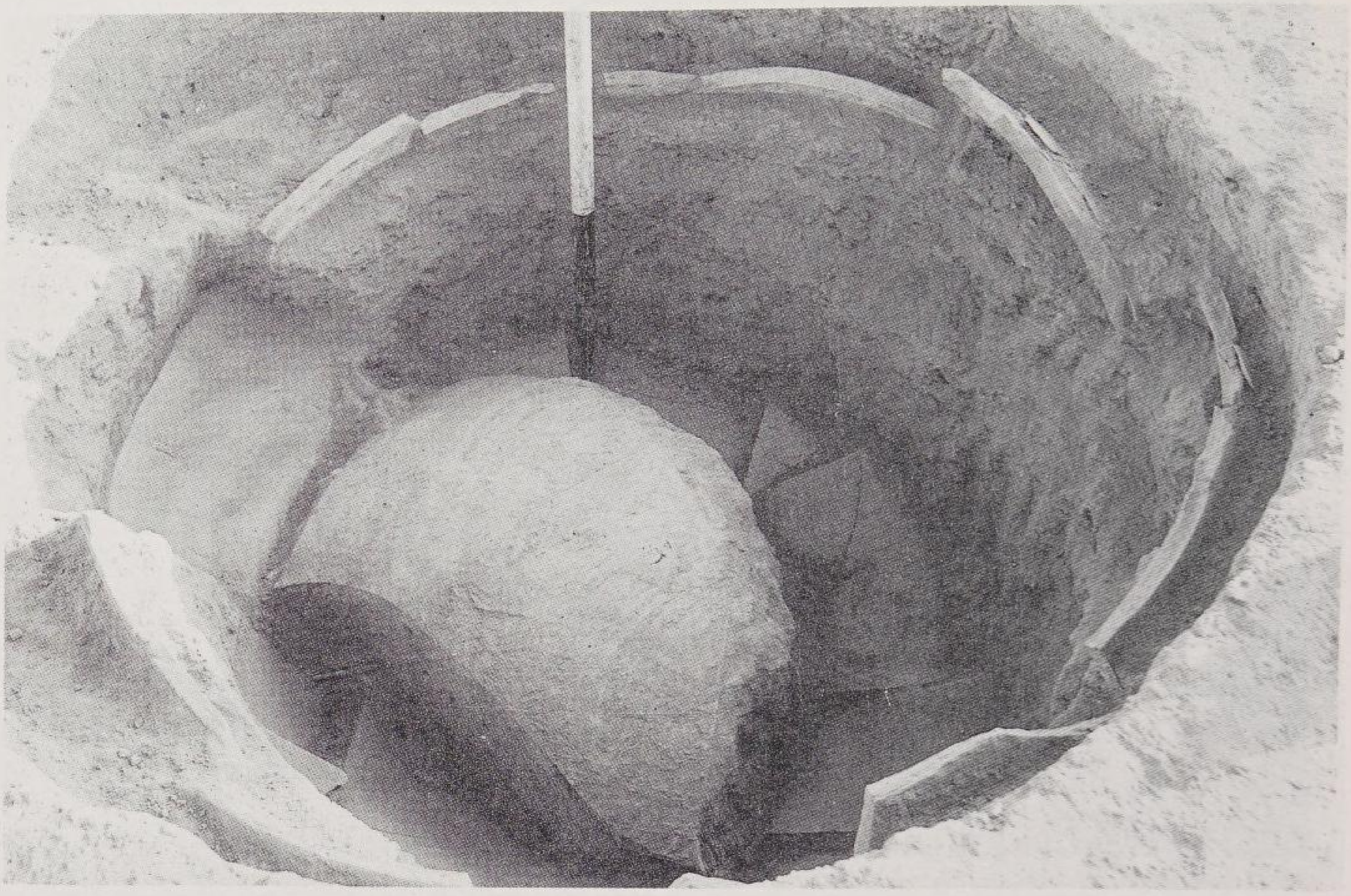
Pl. 41.4. Lewan: Site 1 House B, section showing depth of occupation.



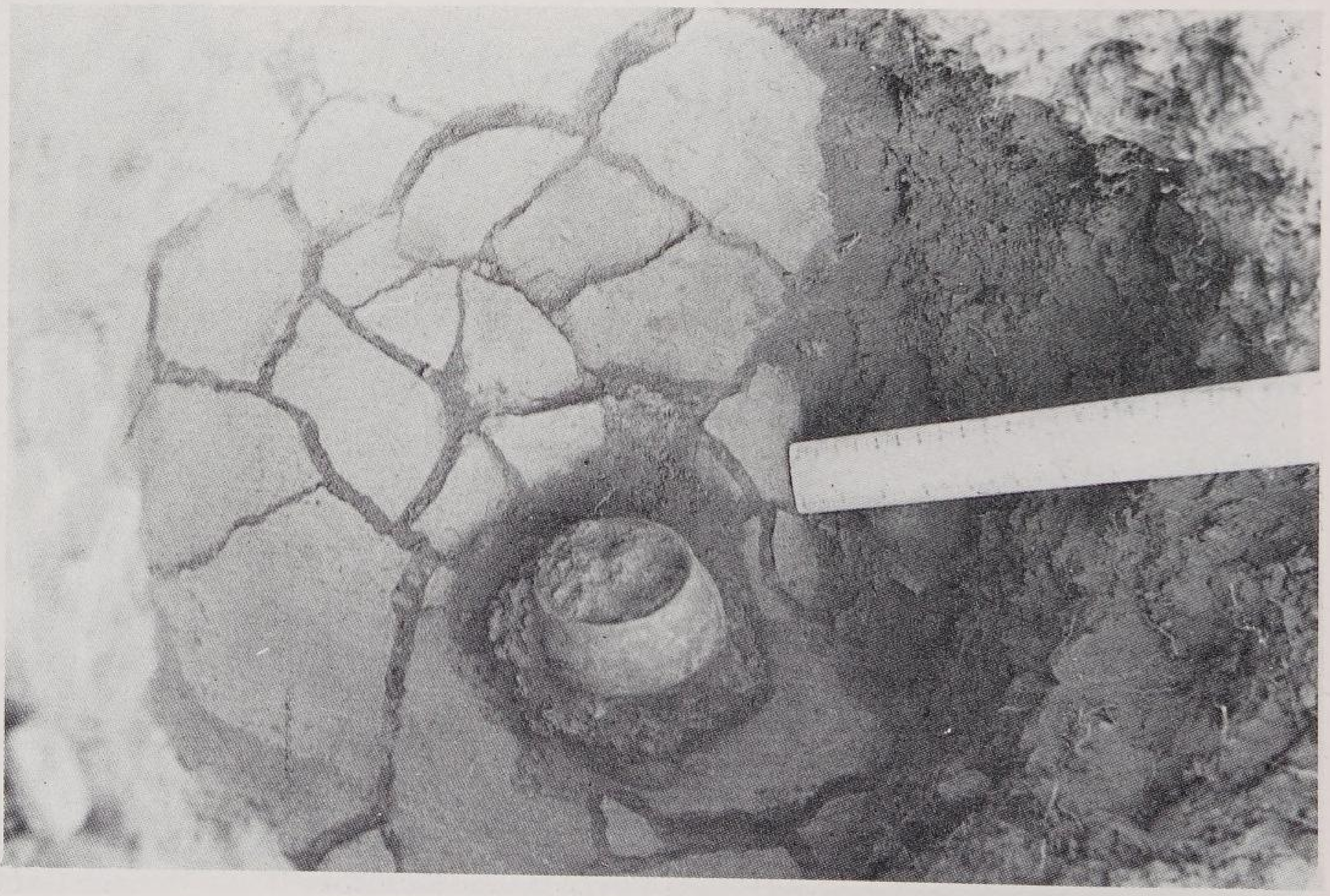
Pl. 41.5. Lewan: Site II pit 7 before excavation.



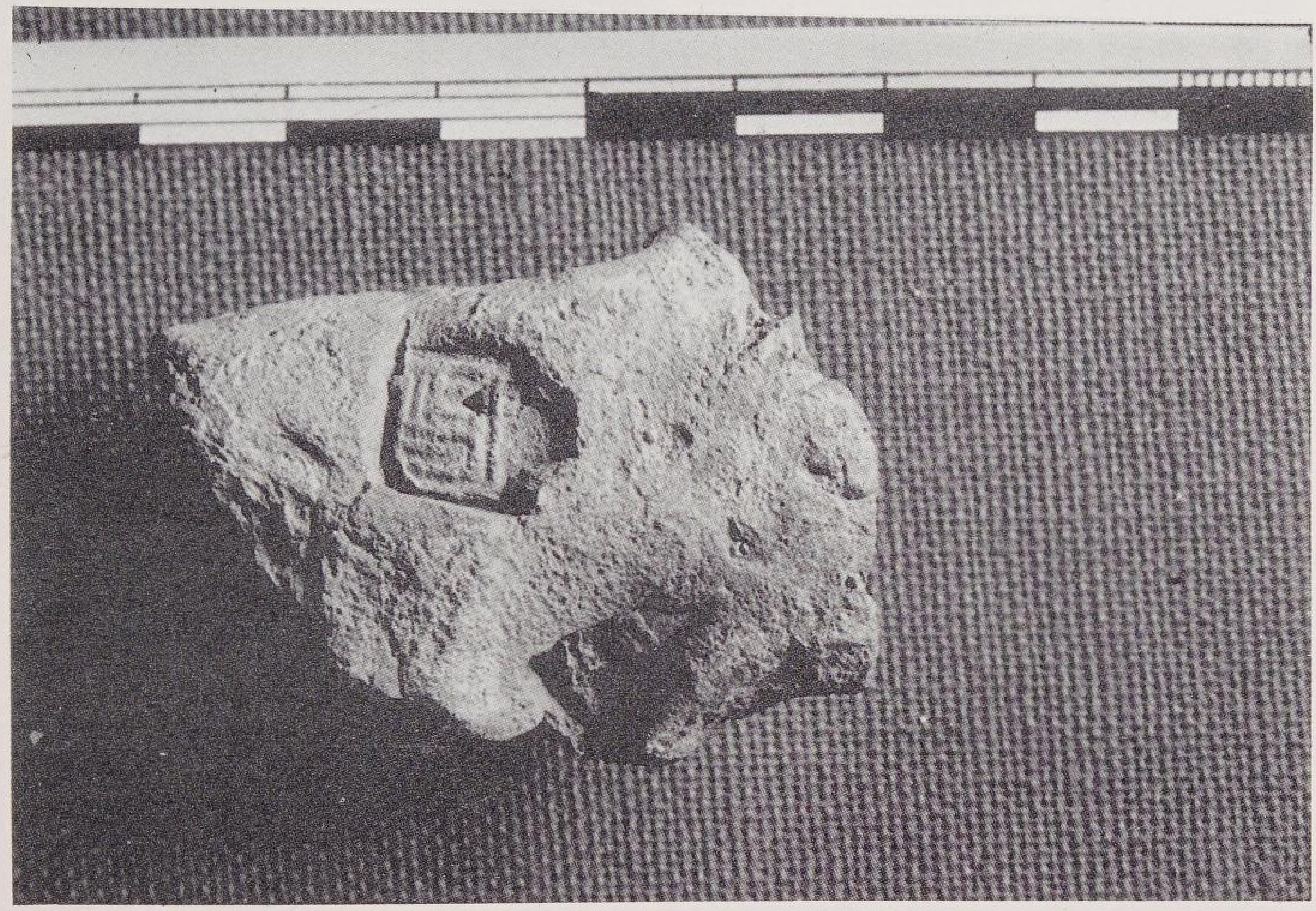
Pl. 41.6. Lewan: Site II Pit 9 showing heavy stone tools in section



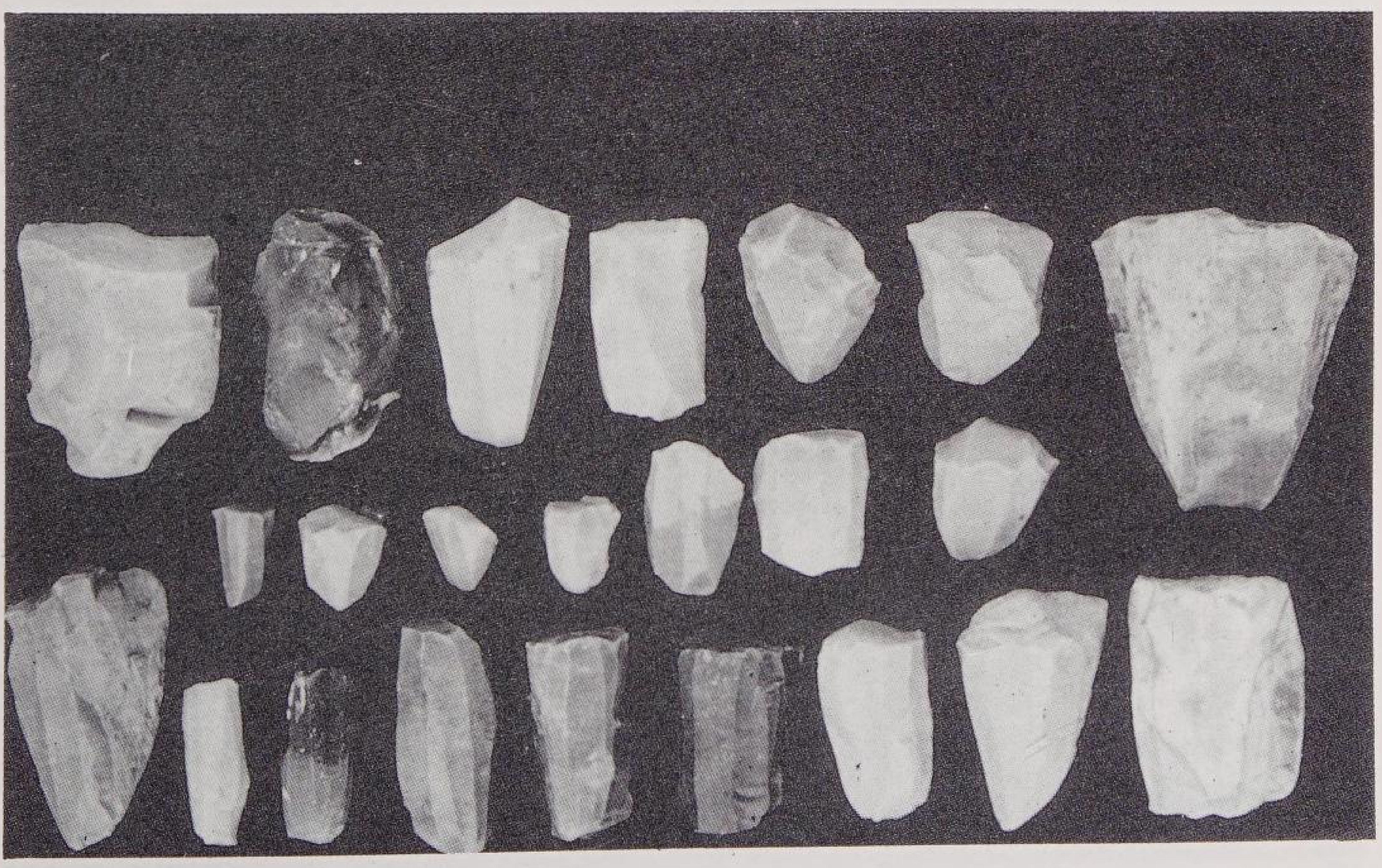
Pl. 41.7. Lewan: Site II Pit 12 pottery storage jar in situ.



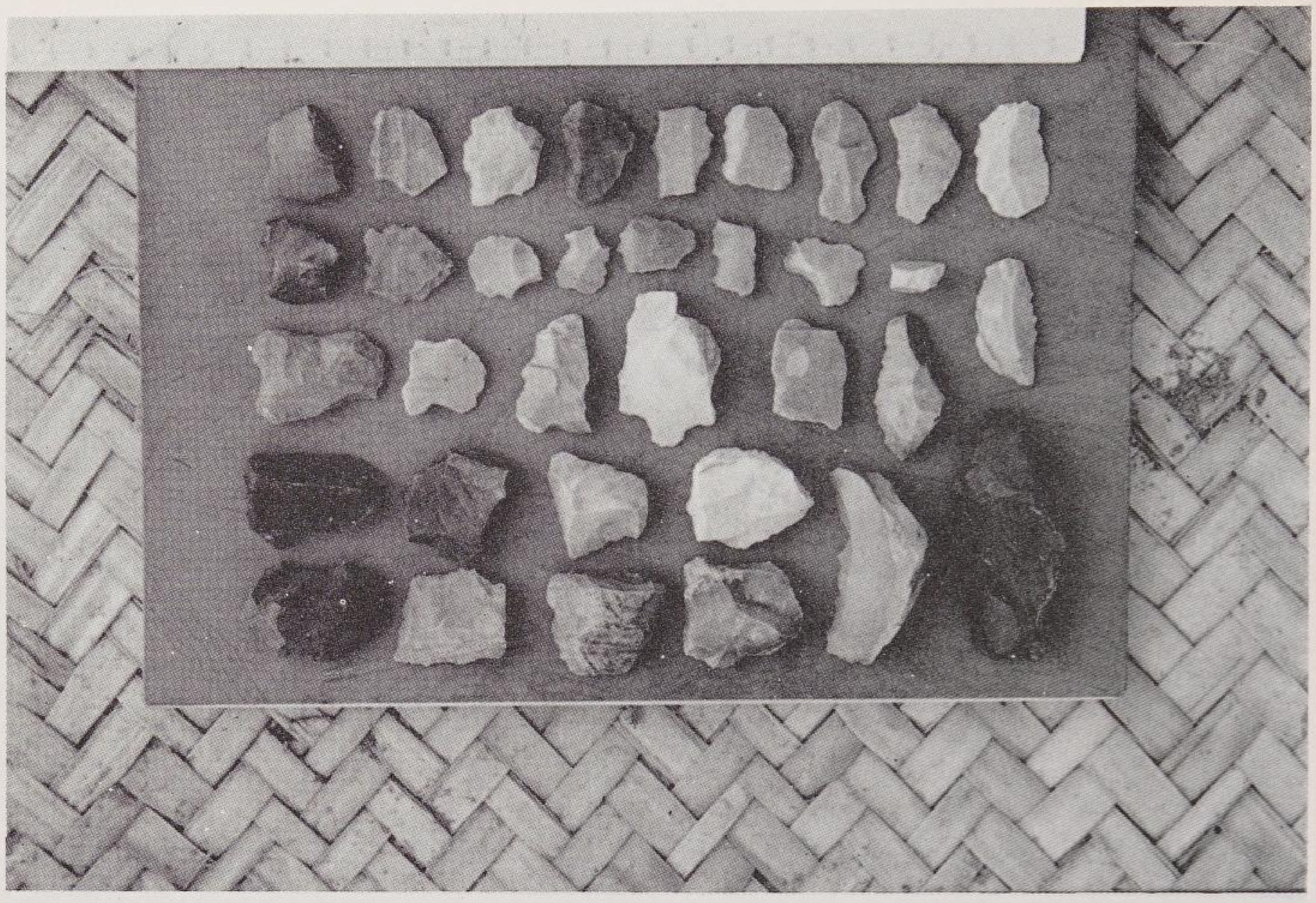
Pl. 41.8. Lewan: Site VI Storage jar with cup.



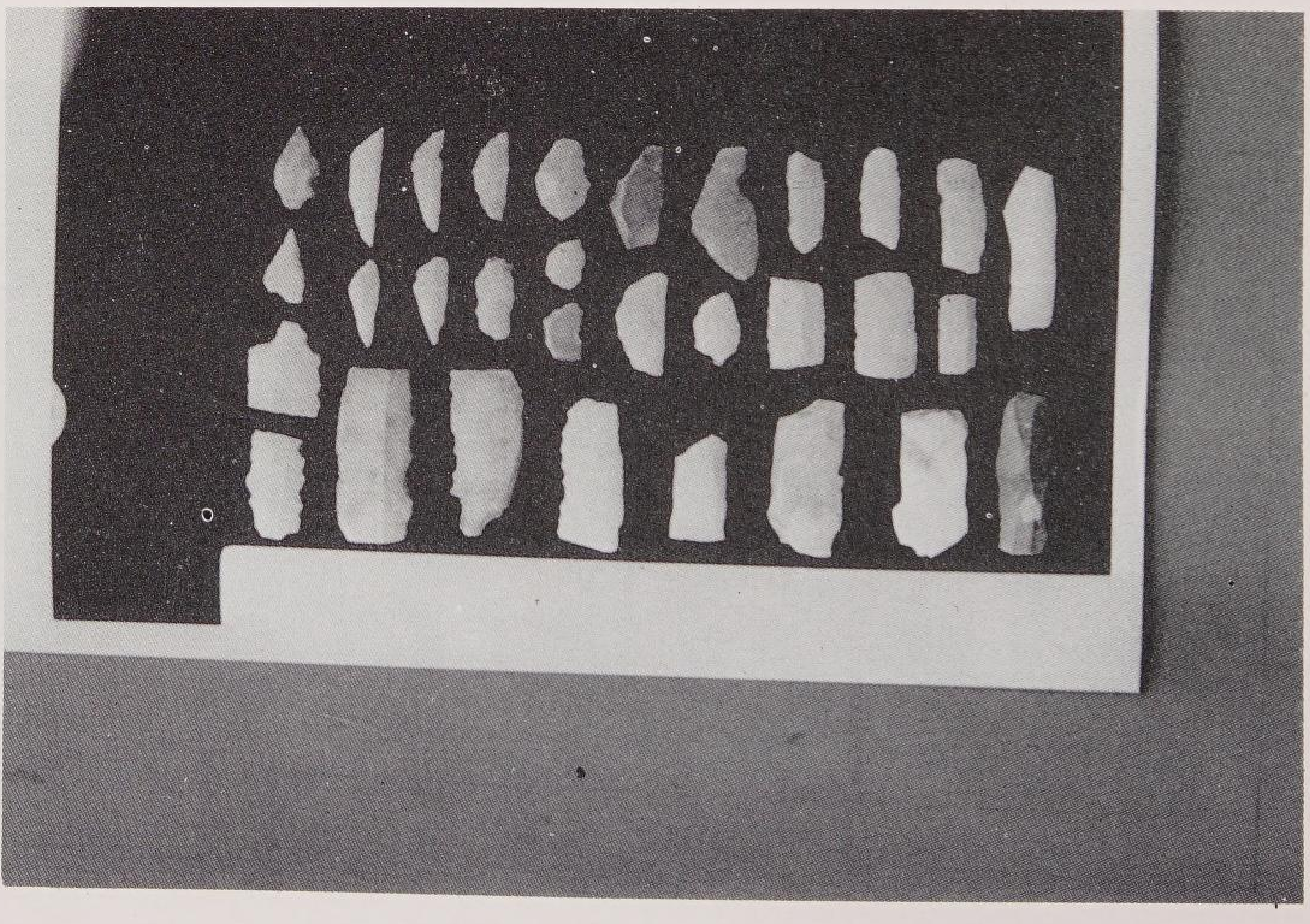
Pl. 41.9. Lewan: Site V seal impression on clay form.



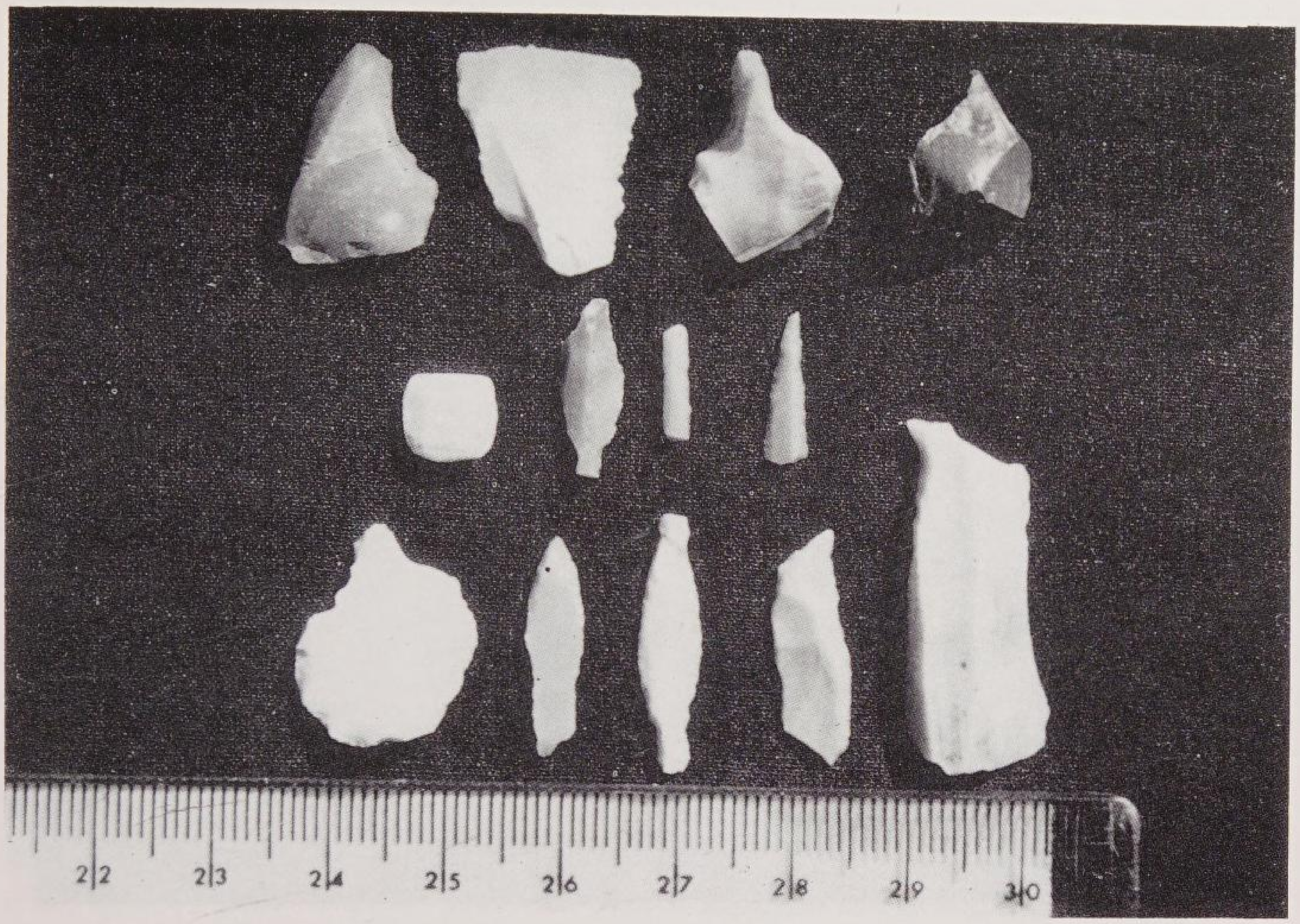
Pl. 41.10. Lewan surface collection: blade cores.



Pl. 41.11. Lewan surface collection: scrapers.



Pl. 41.12. Lewan surface collection: sections of blades and microlithic tool components.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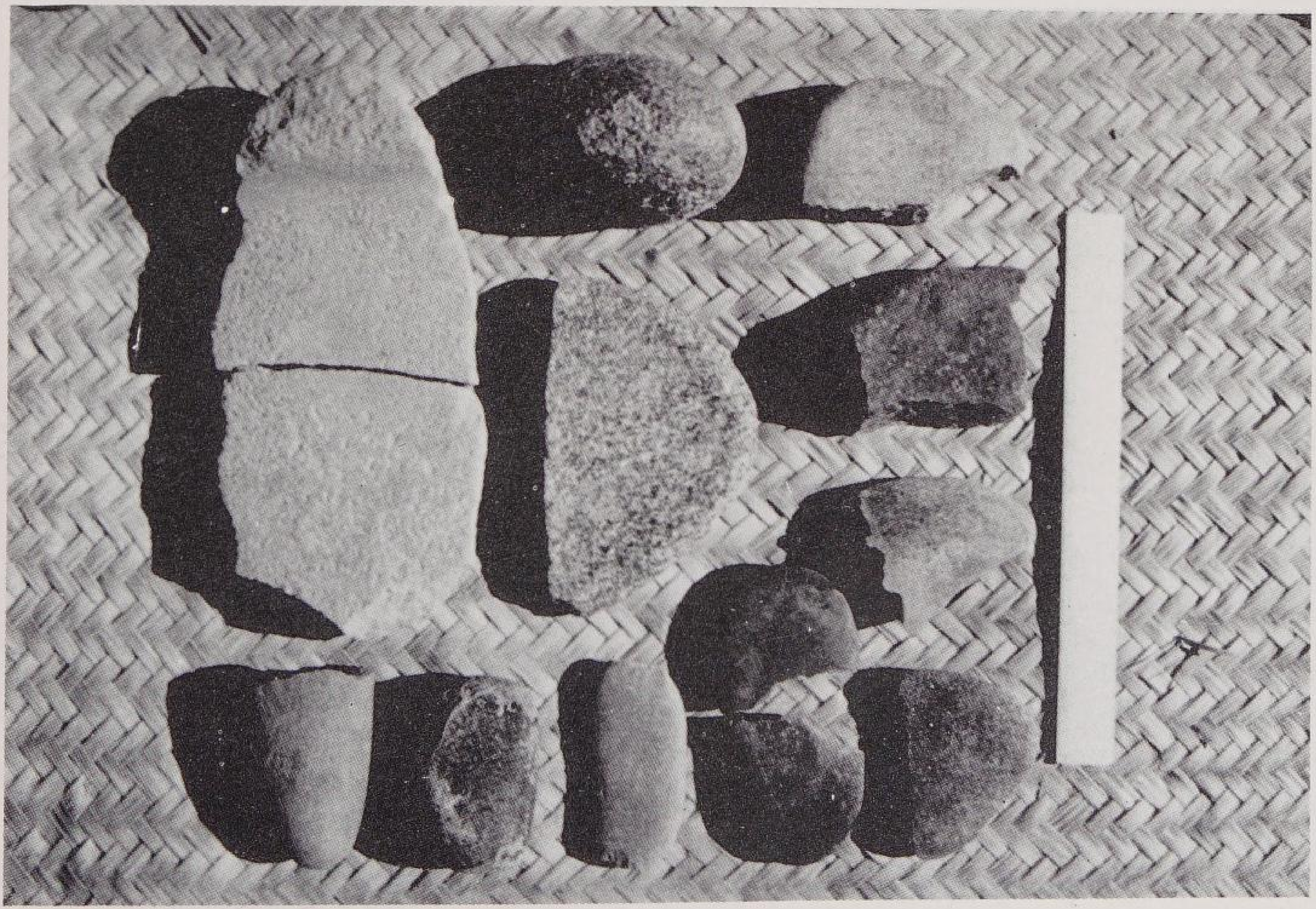
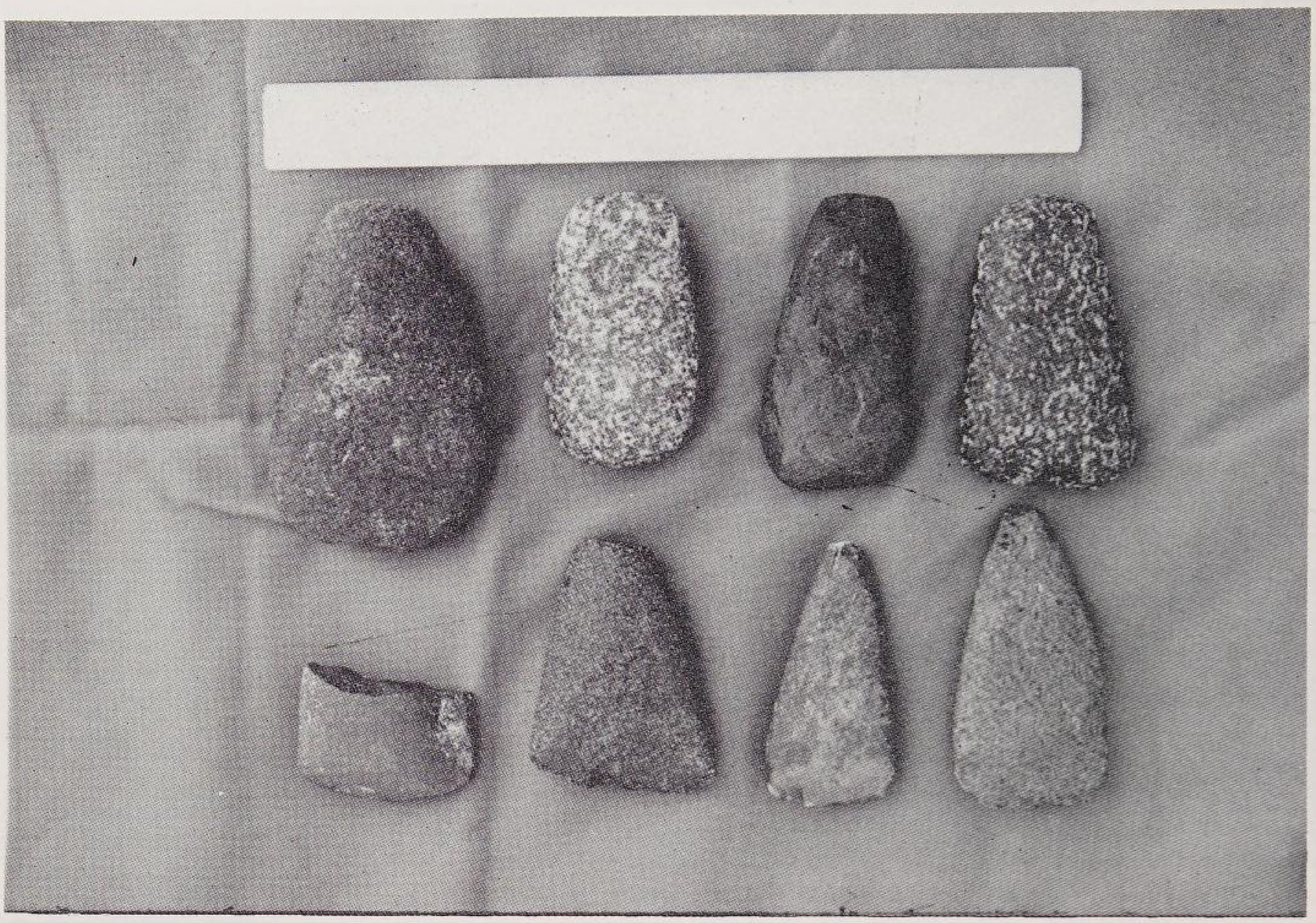
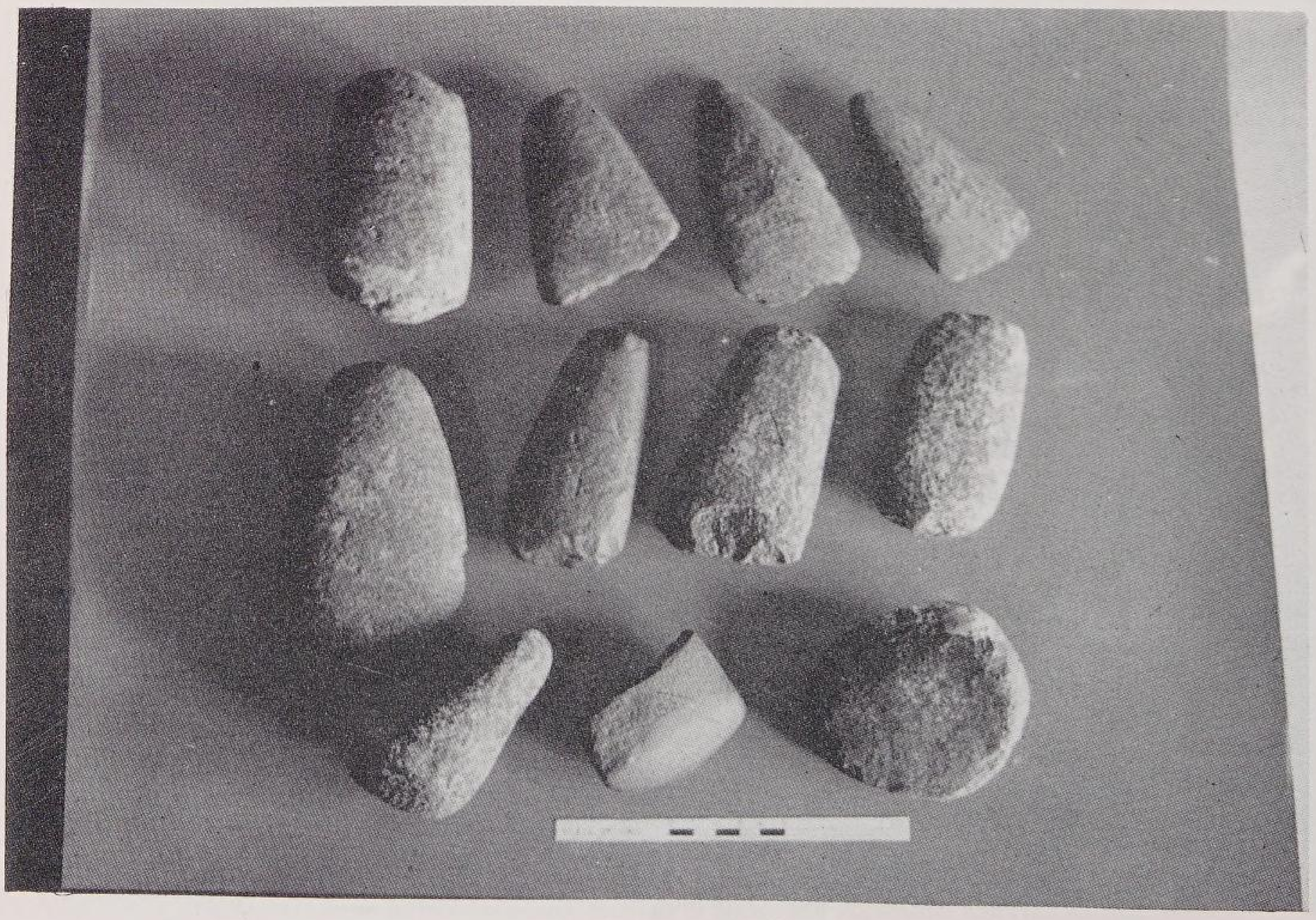
Pl. 41.13. Lewan surface collection: Bead making equipment (awls and drill heads) and one bead collected from the bead making area.



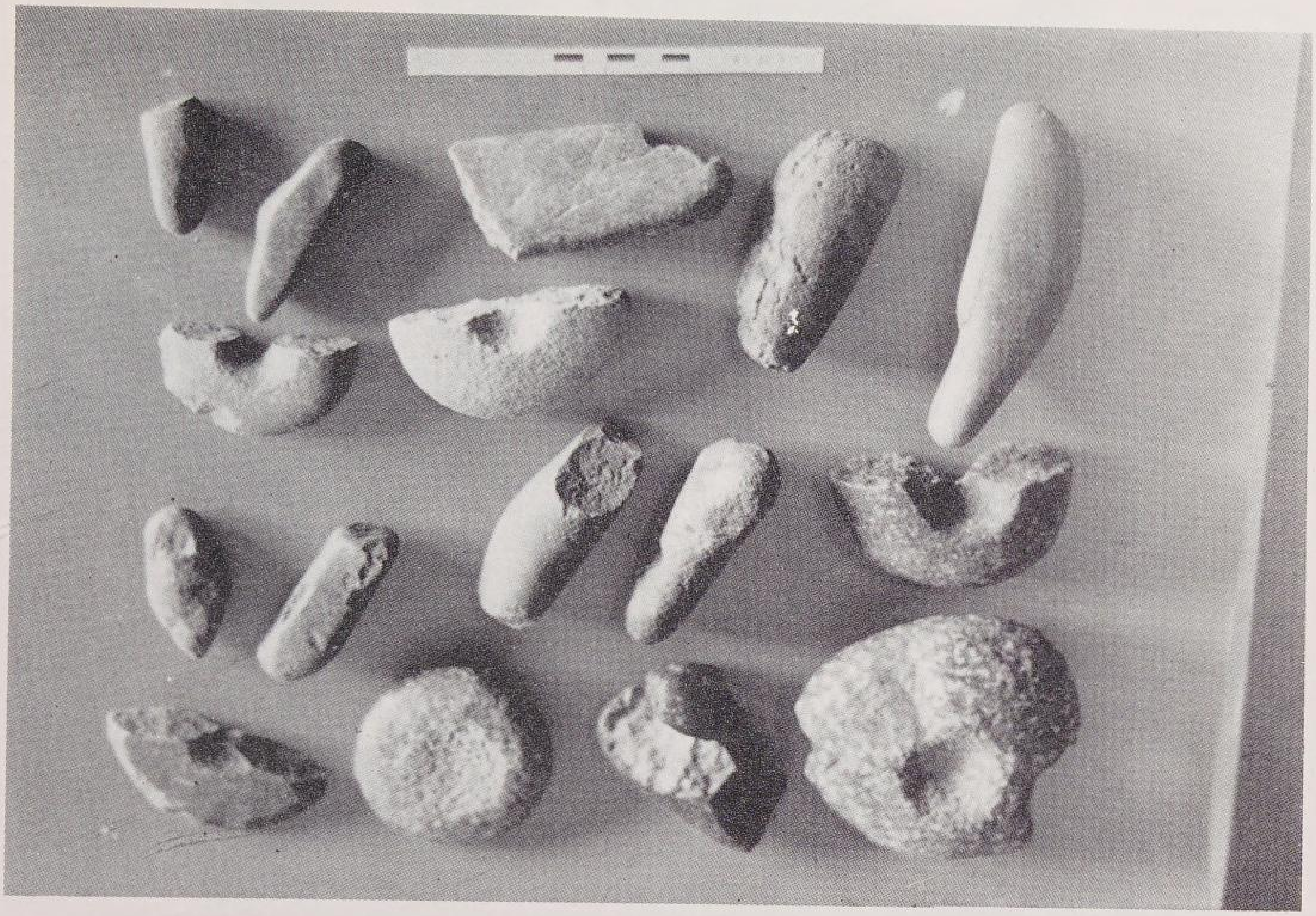
Pl.41.14. Lewan surface collection: Stone axes and axe-hammers.



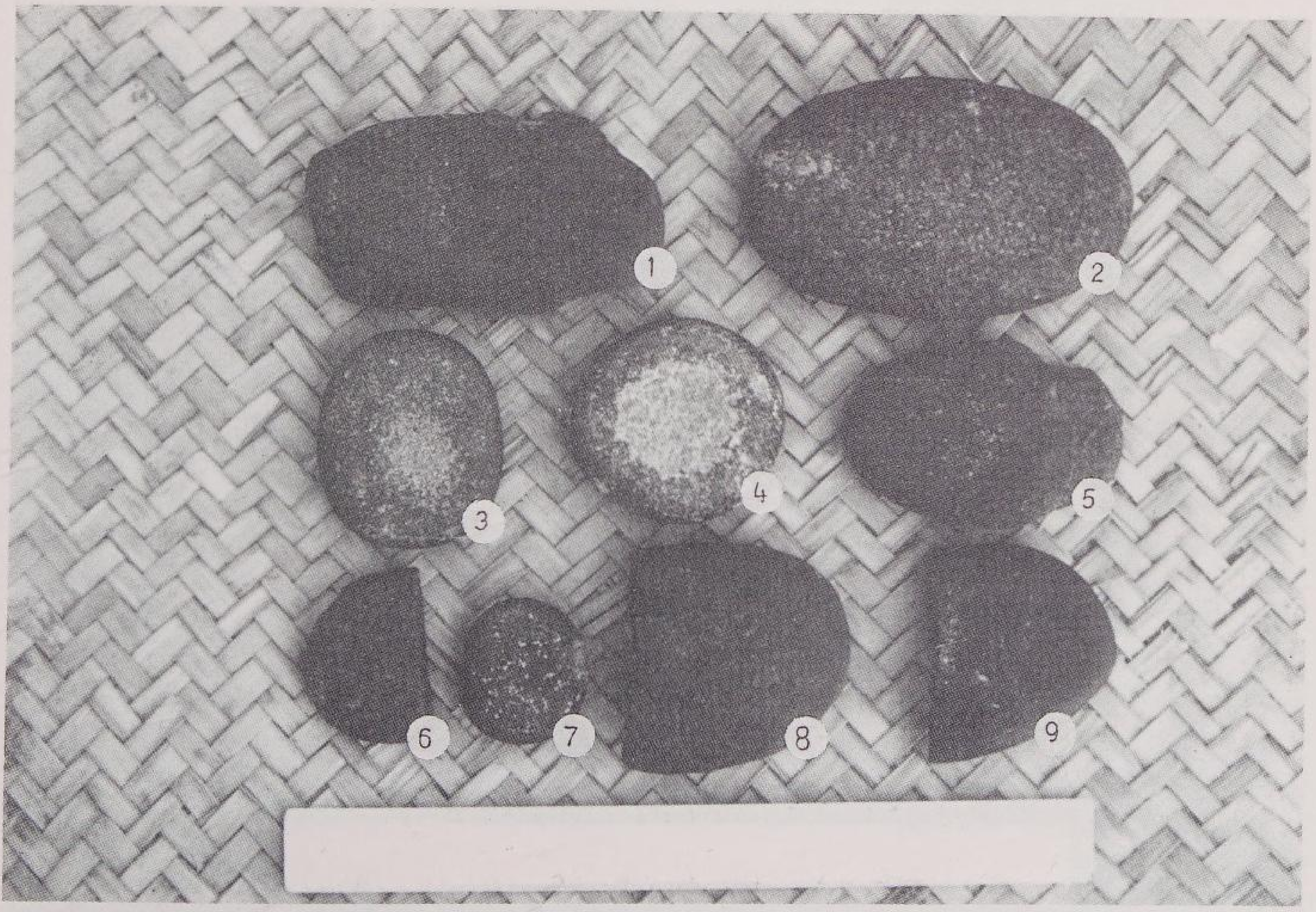
Pl. 41.15. Lewan surface collection: Stone axes, axe-hammers, cylindrical hammer and discoidal hammer.



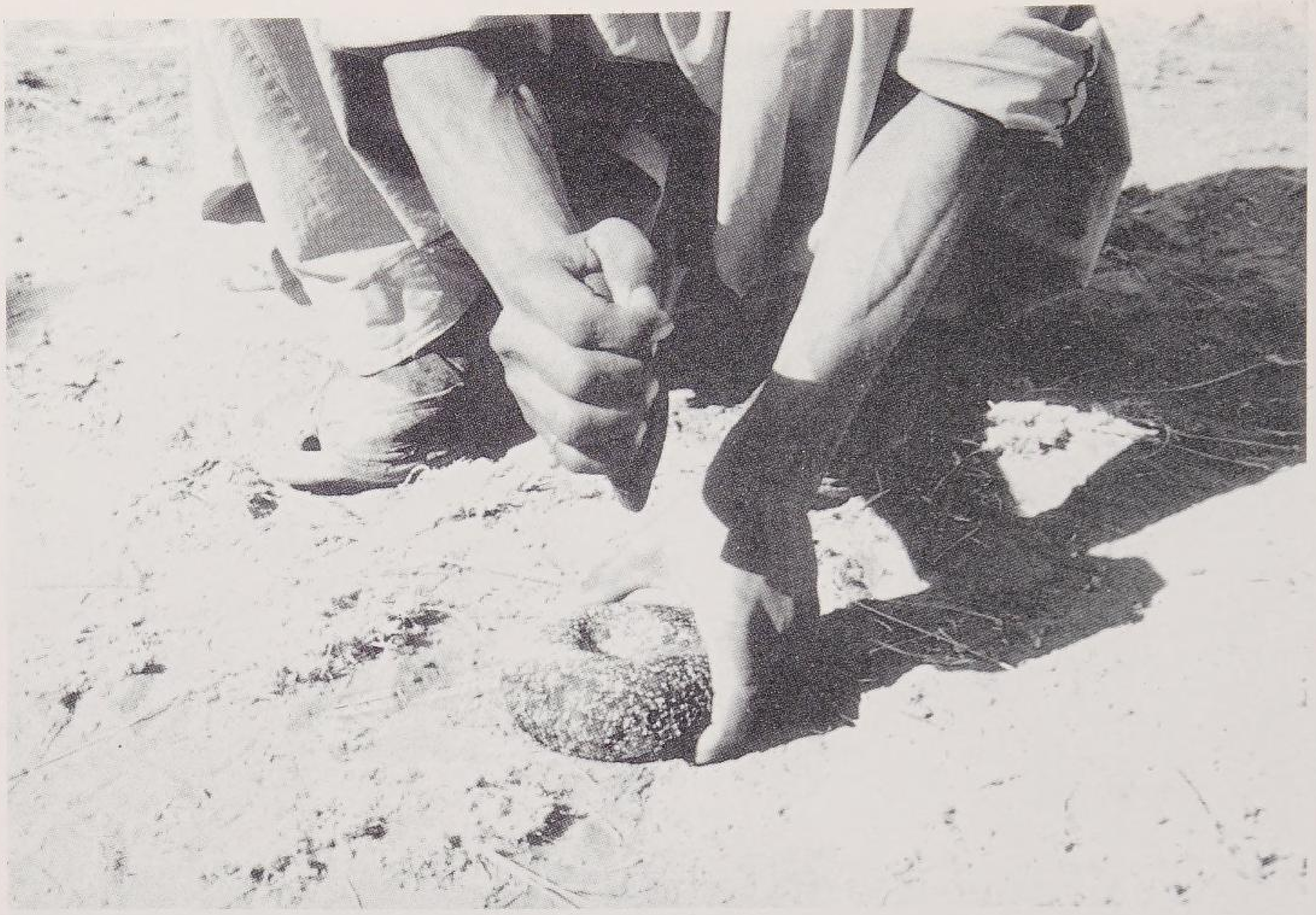
Pl. 41.16. Axes and hammers, all apparently broken in use.



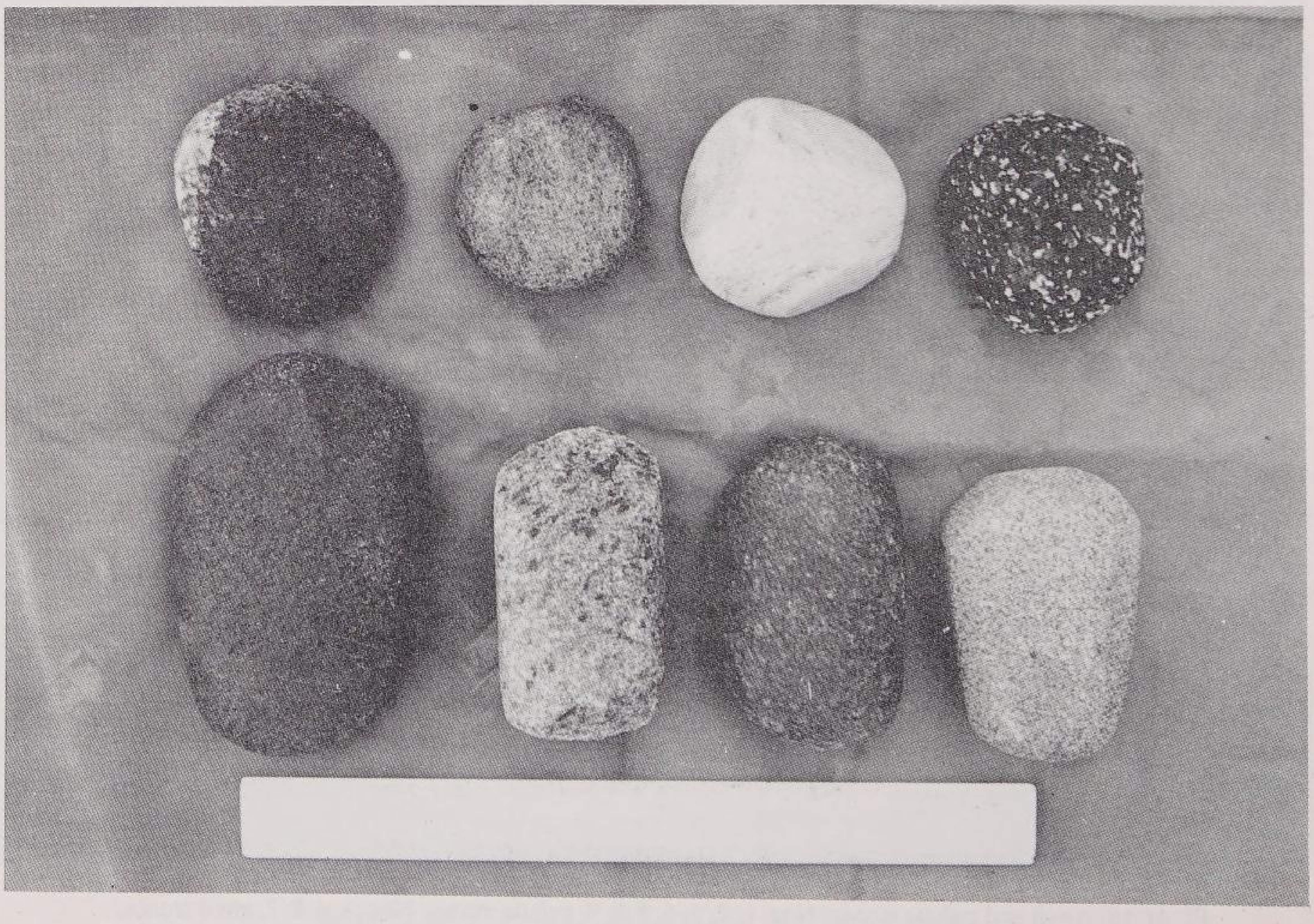
Pl. 41.17. Ringstones in various stages of manufacture, and pointed hammers or ringstone fabricators.



Pl. 41.18. Anvil and palette stones. Nos. 1, 2, 5, 6, 8 & 9, palette stones; Nos. 3, 4 & 7, anvil stones.

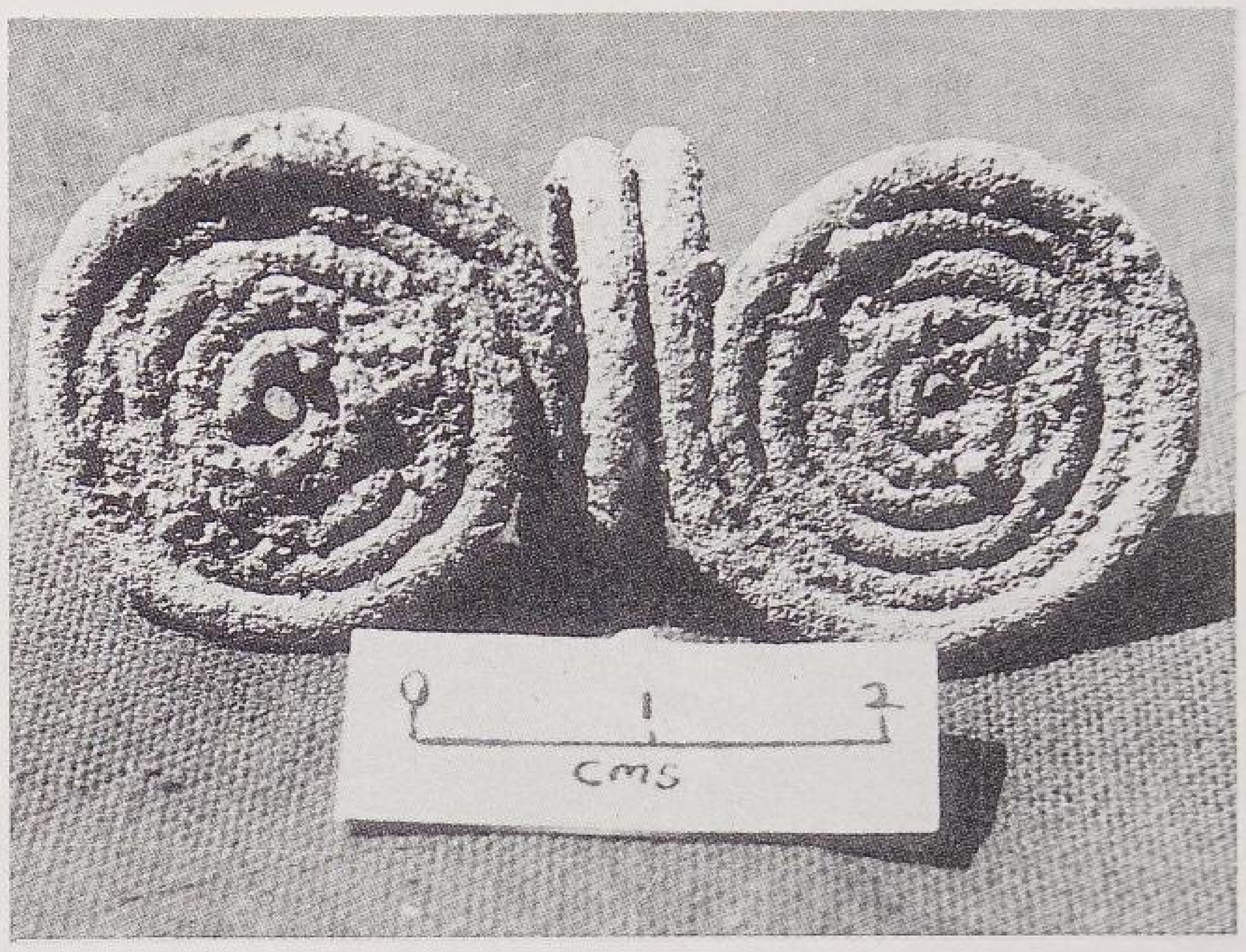


Pl. 41.19. Mohammad Khan demonstrating one of the inferred processes in manufacturing a ringstone, using a pointed hammer to make the central perforation.

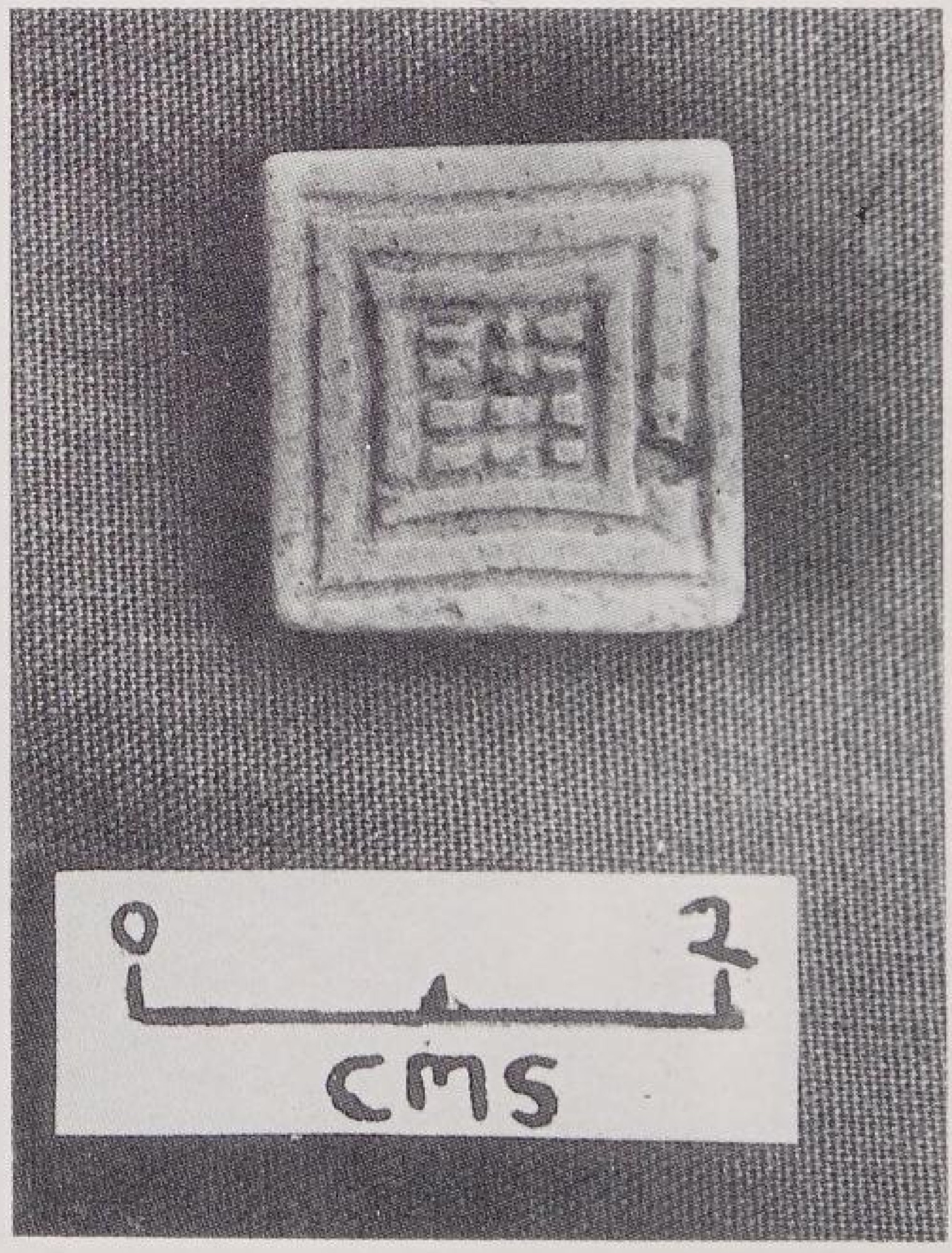


Pl. 41.20. Hammers. (Top row) spherical hammers or sling stones; (bottom row) cylindrical hammers.

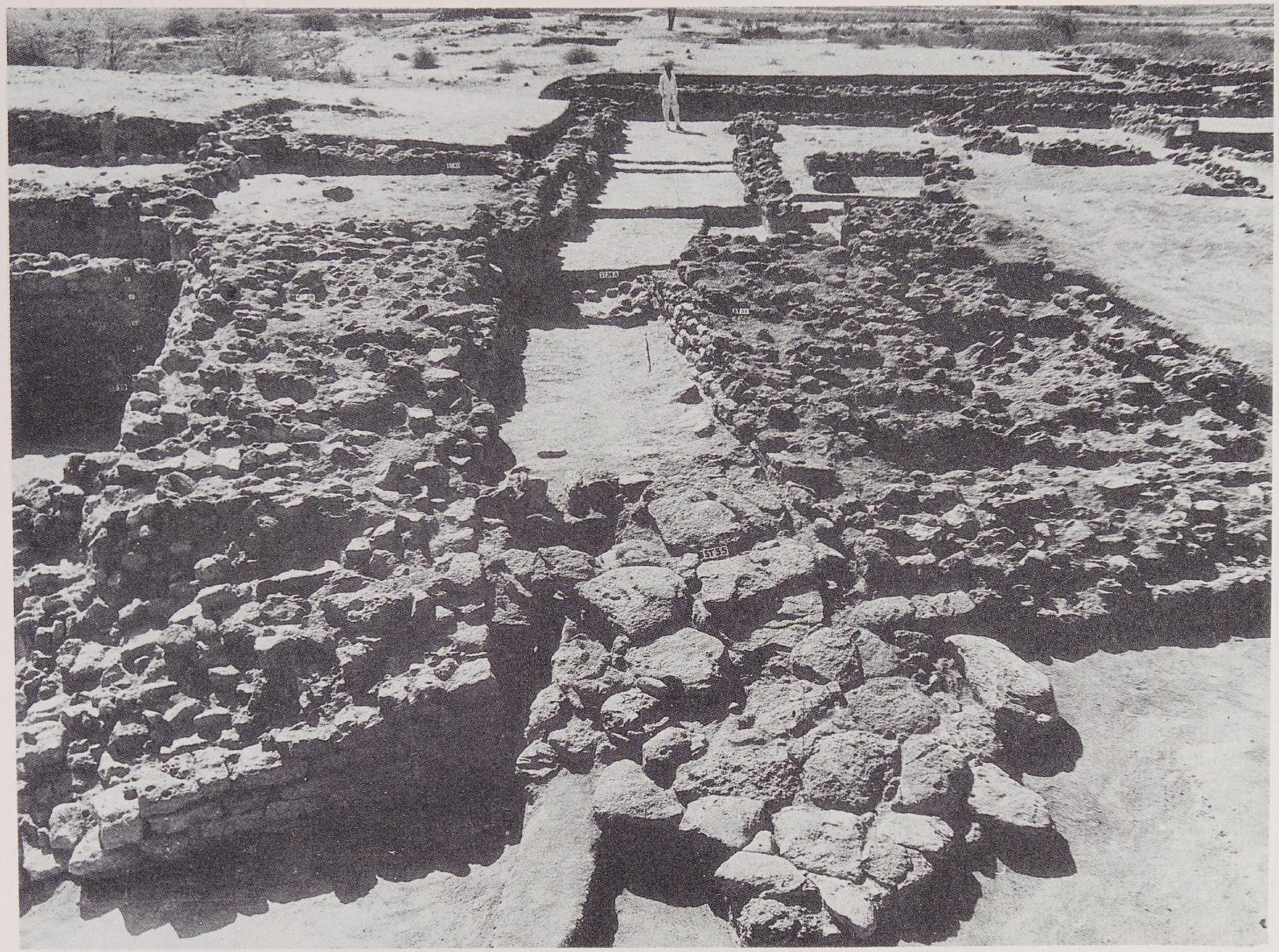
Pl. 41.21. Mohammad Khan demonstrating the close correspondence between one of the axes and one of the grinding stones.



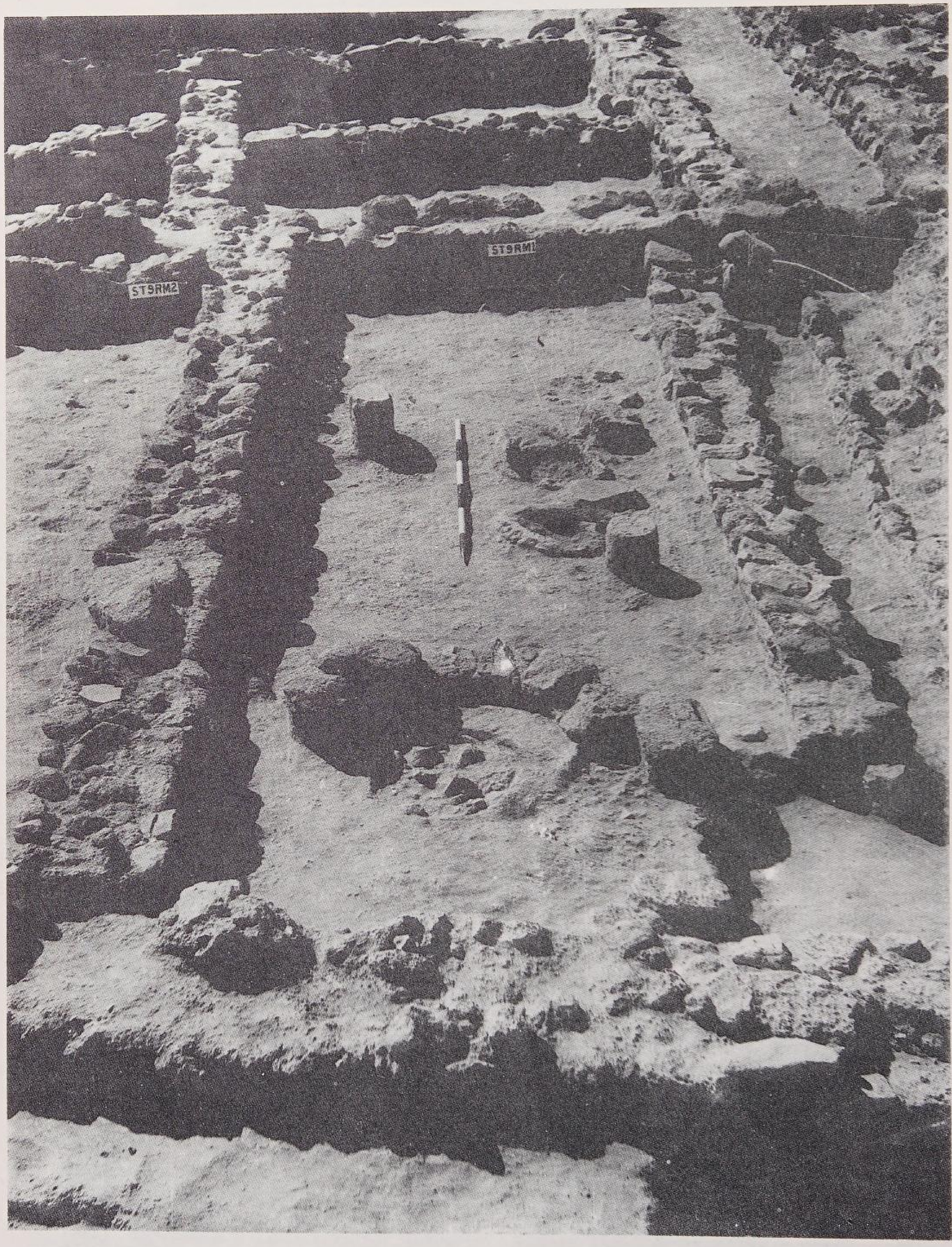
Pl. 42.1. Finger ring of copper, Kuntasi.



Pl. 42.2. Faience seal from structure 16, Kuntasi.



Pl. 42.3. Entrance gateway and road flanked by structures, Kuntasi.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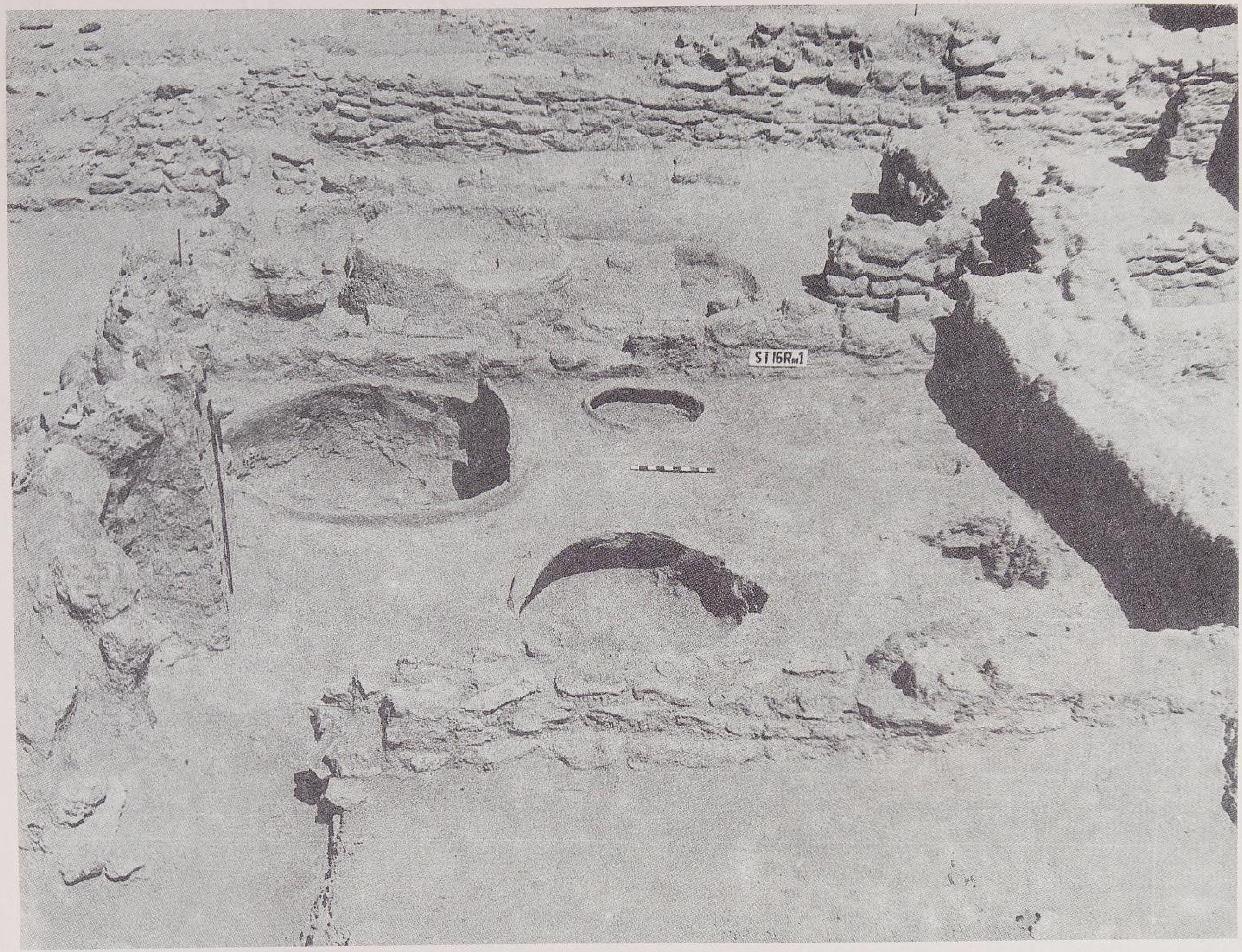
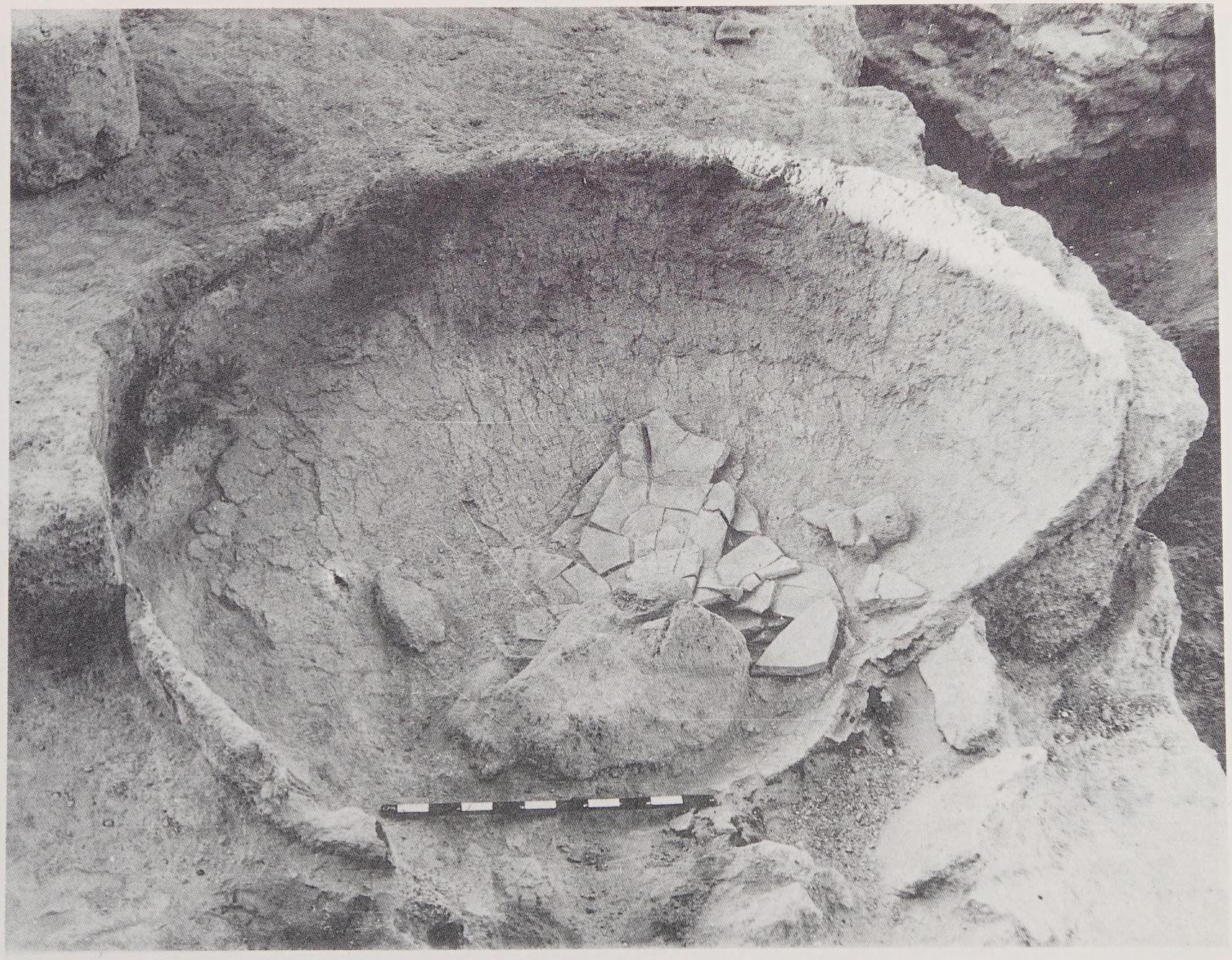
Pl. 42.4. Furnaces, structure 9, Kuntasi.



Pl. 42.5. Pit silos, Kuntasi.

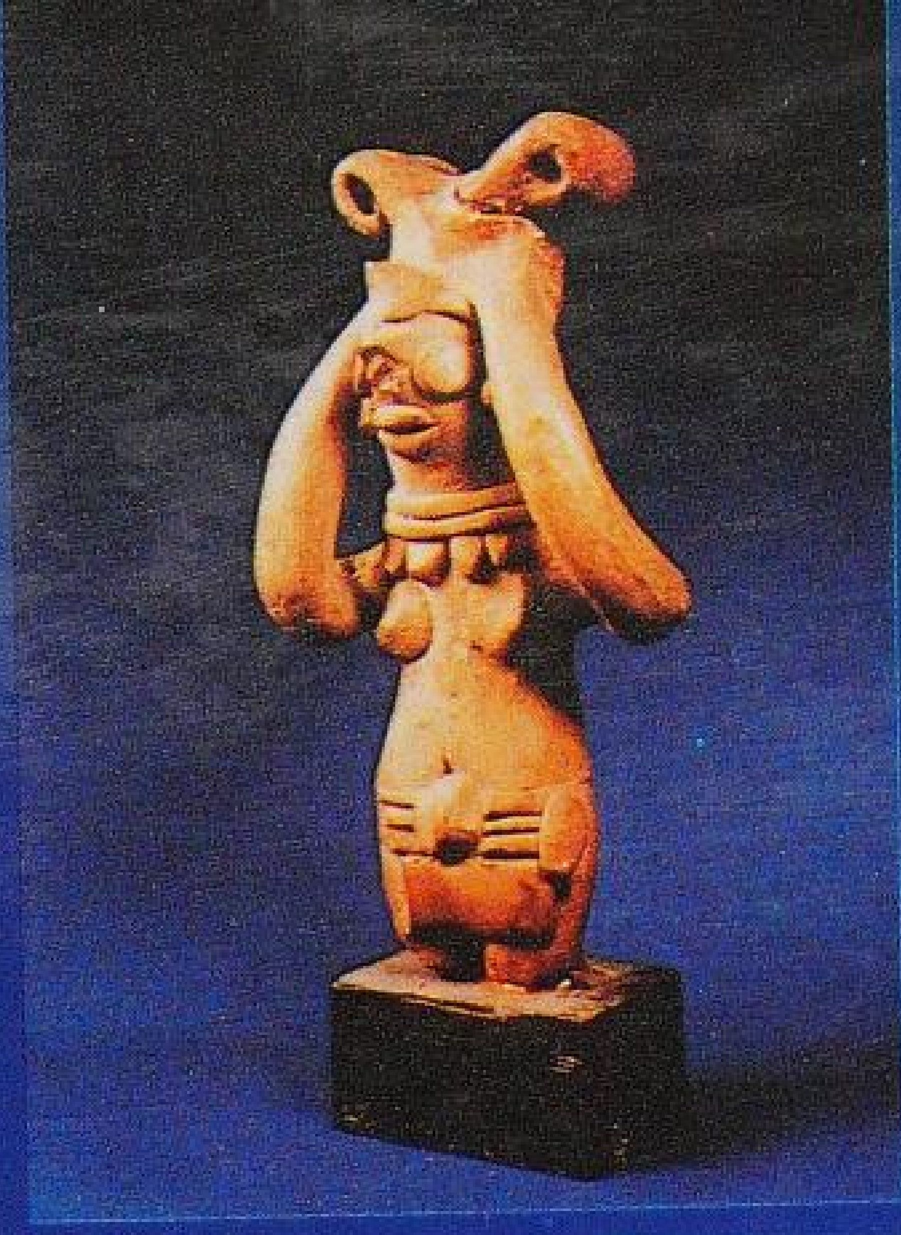
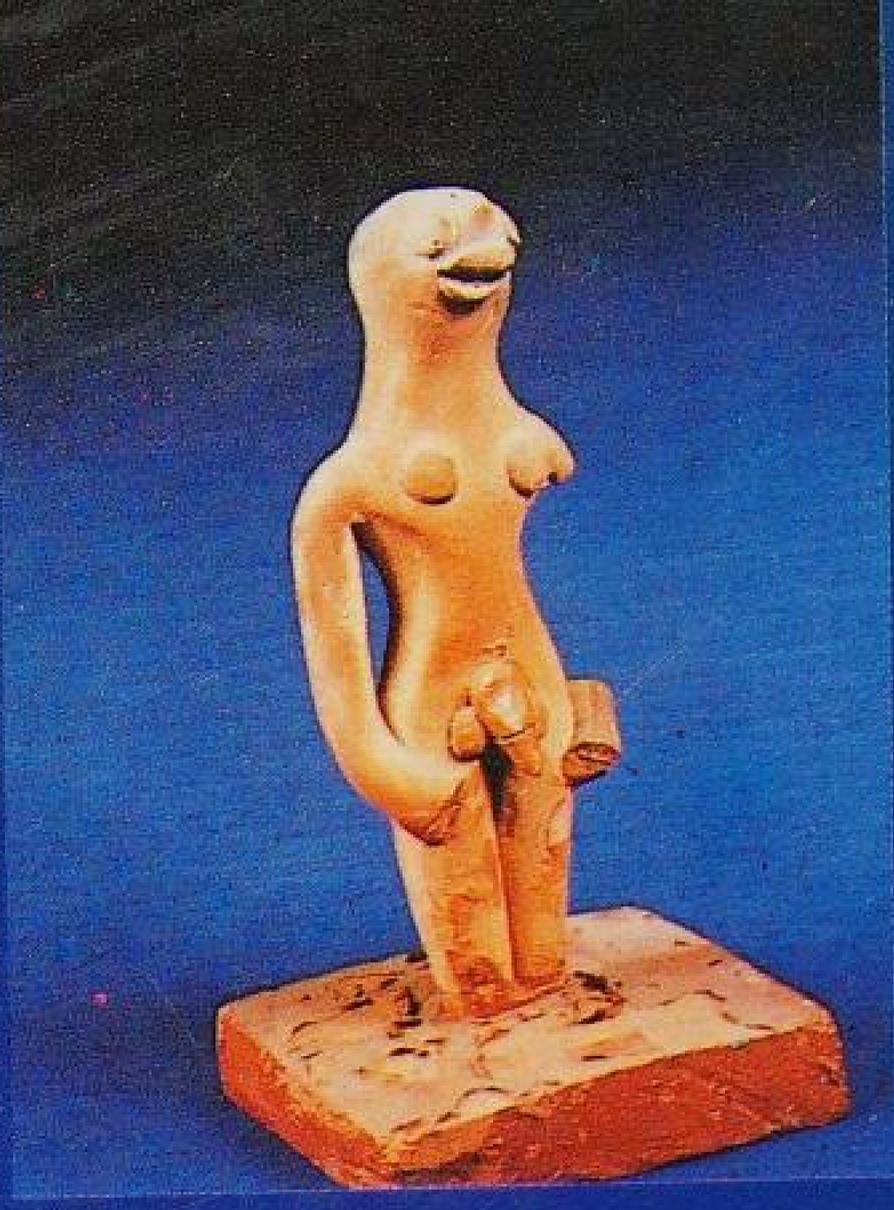
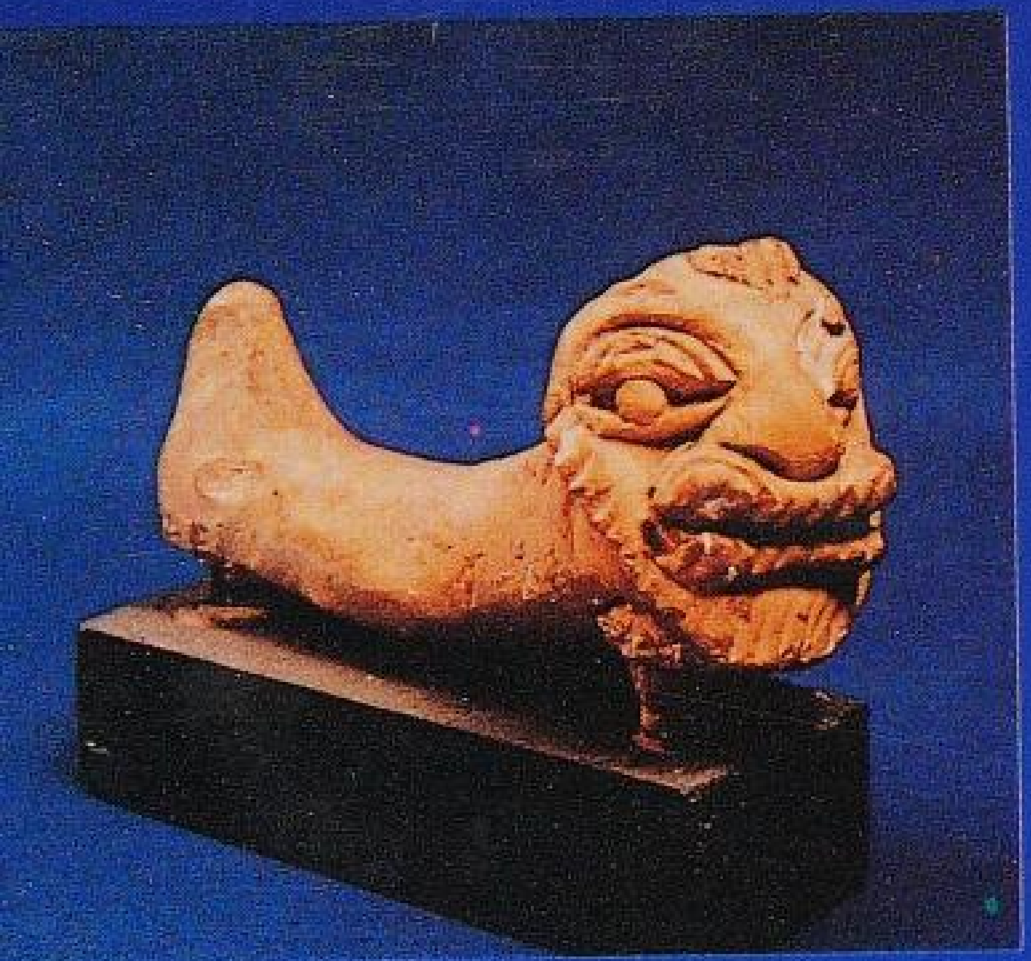
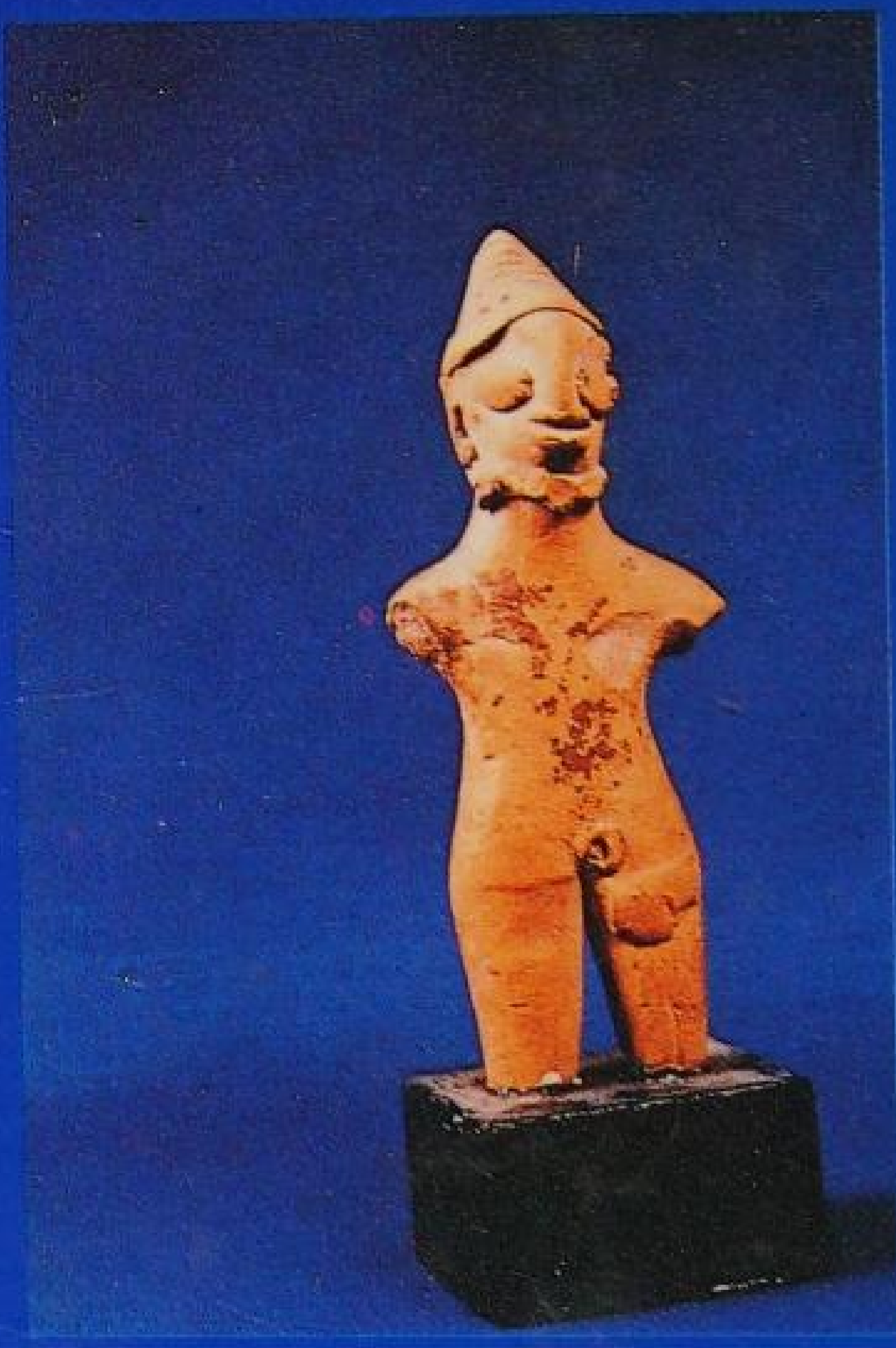
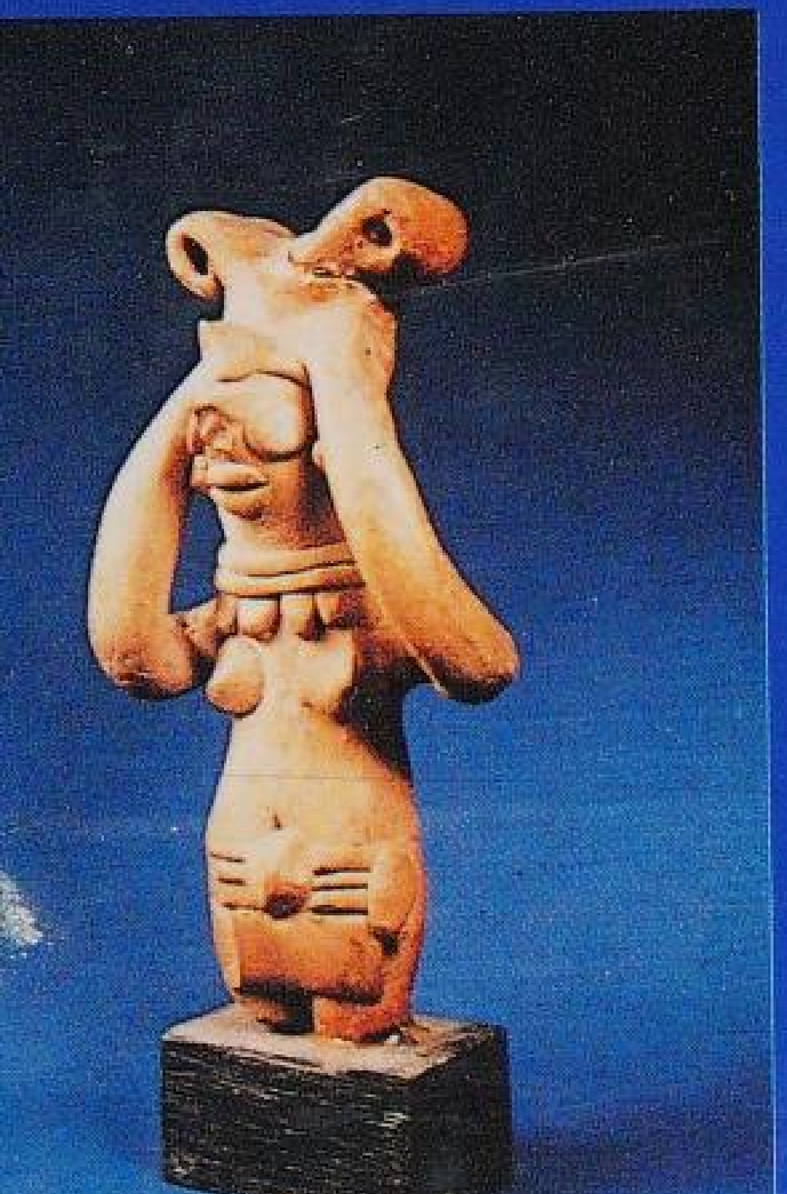


Pl. 42.6. Pottery kiln, Kuntasi.

Dr. Gregory L. Possehl is Curator of the Asia Collections at The University Museum and Professor of South Asian Archaeology at the University of Pennsylvania. He has been a student of the Harappan Civilization since 1964 when he first visited Mohenjo-daro. This interest has been continued with excavations of Rojdi, Babar Kot and Oriyo Timbo in Gujarat.

In addition to his research on the Harappan Civilization Professor Possehl has interests in prehistoric and protohistoric adaptive systems, especially the development of farming communities and pastoral nomads. The social and ecological relationships between hunter/gatherers and village farming communities have also been a subject of his research.

Professor Possehl's major books include *Ancient Cities of the Indus, Kulli; Trade and the emergence of urbanization in the Indus Valley*. His most recent works are a report on his excavations at Rojdi titled *Harappan Civilization and Rojdi* as well as a festschrift for Walter A. Fairservis, Jr., *South Asian Archaeology Studies*.

ISBN 81-204-0779-2